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TAKAHASHI (W. N.) & ISHII (M.). **The formation of rod-shaped particles resembling Tobacco mosaic virus by polymerization of a protein from mosaic-diseased Tobacco leaves.**—*Phytopathology*, 42, 12, pp. 690–691, 1 fig., 1952.

The methods whereby the abnormal macromolecular 'X' protein, recently shown by the authors to be present in specially prepared extracts of mosaic tobacco leaves [*R.A.M.*, 32, p. 346], was induced to polymerize into rod-shaped particles resembling in several respects those of tobacco mosaic virus are explained. The procedures included extraction by the ether-water method, ultracentrifugation, electrophoretic analysis, and electron micrography.

MARCELLI (E.). **Ultimi risultati nella lotta contro l'oidio del Tabacco (Erysiphe cichoracearum).** [Latest results in the control of Tobacco *Oidium* (*Erysiphe cichoracearum*).]—*Tabacco, Roma*, 56, 641, pp. 370–374, 1952. [English summary. Received January, 1953.]

In greenhouse spraying tests at the Scientific Experimental Institute for Tobacco, Scafati, Italy, two applications of 0·4 per cent. salicylanilide at an interval of 20 days had a markedly preventive action on *Erysiphe cichoracearum* on tobacco [*R.A.M.*, 31, p. 461; 32, p. 346] and gave much better control than sulphur dusting, which was more effective than thiram, though the last-named had considerable preventive effect. Sodium salicylate and potassium permanganate were less effective and caused serious burning.

GIGANTE (R.). **Osservazioni sulla 'farfara' del Tabacco in provincia di Lecce.** [Observations on 'farfara' of Tobacco in the province of Lecce.]—*Ann. Sper. agr.*, N.S., 6, 5, pp. 1351–1388, 18 figs., 1952. [English summary.]

Two years' investigations of a tobacco disease complex widespread in the province of Lecce, Italy, and locally known as 'farfara' demonstrated that it consisted of three diseases: wildfire (*Pseudomonas tabaci*) [*P. tabacum*: *R.A.M.*, 32, p. 516], tobacco ring spot virus [loc. cit.], and tobacco streak virus [cf. ibid., 30, p. 201; 32, p. 39]. Ring spot was experimentally transmitted to the varieties Erzegovina, Xanthi Yokà, and Perustitza; it was sometimes apparent in seedlings ready for transplanting, generally affected only the lowest leaves, and was favoured by high humidity. Streak was less common and was not present in the seed-beds. It was also transmitted experimentally to Erzegovina and Xanthi Yokà.

HOPKINS (J. C. F.) & RILEY (E. A.). **Bacterial leaf spot of Nicandra physaloides Gaertn.**—*Rhod. agric. J.*, 49, 6, pp. 343–345, 2 pl., 1952.

In February, 1951, a plant of *Nicandra physaloides* growing in a tobacco field in [Southern] Rhodesia in which wildfire (*Pseudomonas tabacum*) had been present was found to be affected by a bacterial disease with symptoms closely resembling

those of wildfire but not caused by *P. tabacum* [cf. *R.A.M.*, 13, p. 132]. Inoculations from *N. physaloides* to tobacco gave symptoms of wildfire in the latter, but this reaction was demonstrated to be due to a bacterial toxin alone, the bacteria (? *Pseudomonas* sp.) themselves being non-pathogenic. On the evidence presented it can be assumed that the Rhodesian isolate is not identical with the bacterium detected in South Africa [loc. cit.], but the similarity of both to *P. tabacum* suggests a close relationship. As wildfire has been present on the farm in Southern Rhodesia for 26 years, a strain of *P. tabacum* may have adapted itself to *N. physaloides* while losing its infectivity for tobacco but retaining its ability to produce toxins. If so, reports of needle-prick infections of hosts other than tobacco with *P. tabacum* would appear to be in need of review to ascertain whether the reactions noted were due to bacterial infection or the presence of a toxin alone.

New Maryland Tomato named Chesapeake.—*Seed World*, 72, 11, p. 91, 1953.

Chesapeake, a new tomato variety resistant to cracking and *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*: *R.A.M.*, 32, pp. 154, 285], was developed at the Maryland Station from a three-way cross of Brown's Special, Marglobe, and Pan America. The variety is suited to Maryland, Delaware, and the southern parts of Pennsylvania. It is hoped that small quantities of seed will be available in 1954.

Lewis (R. W.). **The vitamin nutrition of Alternaria solani.**—*Phytopathology*, 42, 12, pp. 657–659, 4 graphs, 1952.

In studies at the Department of Biological Science, Michigan State College, on the vitamin nutrition of an isolate of *Alternaria solani* from tomato [*R.A.M.*, 32, p. 404], the fungus was found to have no obligate vitamin requirements. Its growth rate was materially increased by the addition to the basic mineral salts liquid medium of biotin at 0·005 μgm., choline at 2 mg., and thiamine at 1 mg. per l. Betaine and beta dimethylaminoethyl alcohol proved to be satisfactory substitutes for choline (the most powerful of the three stimulants).

Kunz (R.). **Die Wirkungsweise von Bacterium solanacearum E.F.S., dem Erreger der tropischen Schleimkrankheit des Tabaks, auf Solanum lycopersicum L.** [The mode of action of *Bacterium solanacearum* E.F.S., the agent of the tropical slime disease of Tobacco, on *Solanum lycopersicum* L.]—*Phytopath. Z.*, 20, 1, pp. 89–112, 7 figs., 8 graphs, 1952.

The filtrate of bouillon cultures of *Bacterium* [*Pseudomonas*] *solanacearum*, obtained from the American Type Culture Collection, Washington, was shown by experiments on tomato leaves at the Federal Technical Institute, Zürich, to contain wilt-inducing metabolic products which were separated by fractionation with alcohol from another component, the slime substances. The latter act on the water economy of the host similarly to glucosans, but the symptoms induced by the slime substances are quite distinct from the glucosan wilt [*R.A.M.*, 26, p. 443], consisting of deep furrows in the stems, which become pliable at the nodes, and a rapid collapse of the plants ensues. Exactly the same effects were produced in comparative tests with slime substances produced by non-pathogenic bacteria from 'mellow' wine. The morphological and anatomical changes in the cell point to a disturbance of the osmotic system.

It is assumed from these experiments that a complex process is involved in the natural occurrence of the disease, determined by intricate combinations of locally separate effects. The concept that 'flooding' of the soil with the bacteria is exclusively responsible for the disorganization of the plants [ibid., 23, p. 462] cannot be given unqualified assent [ibid., 32, p. 547].

Dye (D. W.). **Control of bacterial canker of Tomatoes (Corynebacterium michiganense (Erw. Smith) Jensen).**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 4, pp. 339–340, 1952.

During the 1951–2 season trials were carried out at the Plant Diseases Division, Auckland, New Zealand, for the control of tomato bacterial canker (*Corynebacterium michiganense*) [*R.A.M.*, 31, p. 319], which causes extensive losses of plants and fruit of dwarf and, to a less extent, staked tomatoes. Greenhouse seedlings were infected with *C. michiganense* and to obtain increased infection in the field the transplants were again sprayed with a suspension of the bacterium. Pre-treatment counts showed 72 per cent. of the plants to be infected and evenly distributed over the area. The results, based on one season's observations, indicate that only phygon XL (1 lb. per 100 gals.) applied at 7-day intervals markedly reduced fruit infection (5·3 per cent. as against 15·6 per cent. for the untreated), but it was increased considerably (up to 45·6 per cent.) by copper sprays including Bordeaux (6–8–100).

High incidence of fruit canker may have been due to spray damage and it is suggested that weak Bordeaux mixture causing little plant damage might be effective in controlling the disease.

Gravatt (G. F.). **Diseases of the Chestnut and Poplar in Europe.**—26 pp., Paris, Organization for European Economic Co-operation, 1952.

Part I of this report of the author's visit to six European countries and Turkey in 1950 [cf. *R.A.M.*, 31, p. 463] comprises notes on the importance of native chestnuts and oaks in Europe and on the current situation with regard to blight (*Endothia parasitica*) [loc. cit. and ibid., 32, pp. 222, 459], symptoms, means of spread, the search for resistant varieties, the propagation of Asiatic chestnuts, and the probable future spread of the disease.

Part II is devoted to the poplar disease situation in Europe [ibid., 32, pp. 156, 522] and the danger of introducing new diseases by the widespread and wholesale importation of poplar cuttings.

Barriéty (L.), Jacquiot (C.), Moreau (C.), & Moreau (M[ireille]). **La maladie de l'encre du Chêne Rouge (Quercus borealis Michx).** [Ink disease of Red Oak (*Quercus borealis* Michx).]—*Rev. Path. vég.*, 30, 4, pp. 253–262, 2 pl., 1 map, 1951.

An account is given of the history, symptoms, geographical distribution, economic importance, anatomy, and physiology of ink disease or canker of red oak (*Quercus borealis*) in the Lower Pyrenees, tentatively ascribed to *Phytophthora cinnamomi* [*R.A.M.*, 31, p. 409]. The area of infection appears to be limited by the rivers Adour and Bidouze, the Pyrenees, and the Atlantic Ocean.

Barnett (H. L.), Staley (J. M.), & True (R. P.). **Mycelial mats of Chalara quercina on killed Oak trees as a potential source of perithecia in nature.**—*Phytopathology* 42, 10, pp. 531–532, 1 fig., 1952.

In April, 1952, mycelial mats of *Chalara quercina* producing abundant viable conidia were observed on standing and felled oaks killed during the previous year in West Virginia [*R.A.M.*, 32, p. 404 and next abstracts]. Spermatized with conidia from the appropriate compatibility group, 12 freshly collected mats from three counties produced fertile perithecia and ascospores within three days in a moist chamber at 25° C. [ibid., 31, p. 408]. Furthermore, in May, 1952, perithecia producing typical ascospores were found in mats from two trees in different counties.

The importance of these observations lies in the readiness for spermatization of the mycelial mats situated below the loose, cracked bark. Attracted by the emission

of a characteristic odour, insects [see next abstract] may visit several trees within a local area, carrying conidia from one mat to another.

LEACH (J. G.), TRUE (R. P.), & DORSEY (C. K.). **A mechanism for liberation of spores from beneath the bark and for diploidization in Chalara quercina.**—*Phytopathology*, 42, 10, pp. 537–539, 3 figs., 1952.

Near the centre of each of the mats of *Chalara quercina* collected in West Virginia [see preceding and next abstracts] were one or more thick cushions with daedaloid surfaces composed largely of mycelium and a mass of enlarged fungus cells, which after a few days under humid conditions ruptured the bark, separating it from the wood and forming a large moist chamber for the development of the sporulating mats. Shortly after the formation of the cracks the underlying cavities were invaded by several species of insects, three of which, namely, *Glischrochilus sanguinolentus*, *Epuraea* sp., and an unidentified member of the Orthopteridae were used in tests to ascertain their function in the spermatization of the mats. Blocks of wood or bark bearing mats exclusively of the A-compatibility strain were placed in a moist chamber into which the insects were introduced after crawling over a culture of the B-compatibility strain. Three days later perithecia appeared on the mats thus treated, but not on those kept in insect-free moist chambers. Comparable results followed the spermatization of mats of the B-compatibility strain by insects carrying the A strain and the association in the same moist chamber of both A and B mats with insects from the A tree, which was situated at least five miles from any other known case of wilt. Neither in the laboratory nor in nature did A mats produce perithecia unless they were spermatized with the B strain.

MORRIS (C. L.) & FERGUS (C. L.). **Observations on the production of mycelial mats of the Oak wilt fungus in Pennsylvania.**—*Phytopathology*, 42, 12, pp. 681–682, 1 fig., 1952.

Details are given of the production of mycelial mats on oak trees killed by *Chalara quercina* [see preceding and next abstracts] in five separate infection areas in Pennsylvania [*R.A.M.*, 32, p. 110] surveyed during the spring of 1952. Up to 75 mats were found under the bark of a single tree, mainly on the bole but also on branches, some of which did not exceed $1\frac{1}{2}$ in. in diameter. However, on only one tree did two out of the 12 mats produce fertile perithecia. None of the isolates from mycelial mats formed perithecia on chestnut agar.

STALEY (J. M.) & TRUE (R. P.). **The formation of perithecia of Chalara quercina in nature in West Virginia.**—*Phytopathology*, 42, 12, pp. 691–693, 1 fig., 1952.

In mid-April, 1952, a mycelial mat of *Chalara quercina* [see preceding and next abstracts] on a scarlet oak [*Quercus coccinea*] in West Virginia produced fertile perithecia on 5th May as a sequel to spermatization on opposite ends with conidia of the two compatibility groups. Ascospore cultures in turn gave rise to endoconidia. Perithecia were found on five out of seven recently killed red [*Q.* spp.] and scarlet oaks in widely separated areas, the wood being more heavily infested than the bark.

In surveys during 1951, 54 wilted oaks were found at 45 infection centres, 34 of which were at least a mile distant from any other diseased individual. Of the 31 mapped foci, 17 contained only isolated infected trees, and no extensive areas of infestation were detected, indicating that graft transmission has not yet become important in the State.

FOWLER (M. E.). **Oak wilt : its distribution and control.**—*Plant Dis. Reptr*, 37, 2, pp. 104–109, 1 map, 1953. [Multilithed.]

Most of this information on the history, symptoms, distribution as determined by aerial and ground surveys, severity, and control of oak wilt (*Endoconidiophora*

fagacearum or *Chalara quercina*) [see preceding and next abstracts] in the United States has already been noticed from other sources [*R.A.M.*, 32, p. 405]. The disease is becoming a serious threat to oak cultivation in the eastern States, causing over 50 per cent. mortality in some areas in Wisconsin and Iowa. A brief summary is given of the plans for future control activities.

Himelick (E. B.), Schein (R. D.), & Curl (E. A.). **Rodent feeding on mycelial pads of the Oak wilt fungus.**—*Plant Dis. Reptr*, 37, 2, pp. 101–103, 1 fig., 1953. [Multilithed.]

An examination of red oaks [*Quercus* spp.] affected by wilt (*Endoconidiophora fagacearum* or *Chalara quercina*) [see preceding abstracts] in several widely separated localities in Illinois during 1952–3 revealed irregularly shaped holes in the bark from four to 40 ft. above the ground, exposing the fungus cushions, which were eaten away. The size of the tooth marks and the finding of grey hairs in the frayed bark suggest that the damage was caused by squirrels (*Sciurus* spp.), which may transmit the pathogen [*R.A.M.*, 32, p. 405].

Toole (E. R.). **Two races of Fusarium oxysporum f. perniciosum causing wilt of Albizzia spp.**—*Phytopathology*, 42, 12, p. 694, 1952.

In 1947, at the Division of Forest Pathology, Asheville, North Carolina, an isolate of *Fusarium oxysporum* f. *perniciosum* from *Albizzia procera* in Puerto Rico (*Rep. trop. For. Exp. Sta. P.R., 1944*, 1945) was tested for pathogenicity on seedlings of *A. julibrissin* by dipping the roots in a spore suspension. Seedlings were also tested with a strain of the fungus from *A. julibrissin* [*R.A.M.*, 32, p. 156]. Wilting and vascular discoloration were induced exclusively by the latter. In a further experiment in 1948, *A. julibrissin*, *A. procera*, and *A. moluccana* were inoculated with the same two isolates. Neither was pathogenic to *A. moluccana*, while the other two species were attacked only by the strains from their own hosts. In view of such clear differences in pathogenicity it is proposed to name the form from *A. julibrissin F. oxysporum* f. *perniciosum* race 1, and the other strain race 2.

Lamb (A. F. A.). **Annual Administrative Report of the Conservator of Forests, Trinidad and Tobago, for the year 1951.**—28 pp., 1 map, 1952.

In the forest protection section of this report (pp. 8–9) it is stated that a canker of unknown origin is prevalent on mahogany (*Swietenia macrophylla*) in the Northern Range, particularly on the River Estate where diseased trees were cut down. On private estates older trees have apparently overcome the attack and the natural regeneration is profuse and healthy. *Cordia alliodora* is also affected by a canker [? *Puccinia cordiae*: *R.A.M.*, 10, p. 215].

Aoshima (K.). **Wood-rotting Poria from Japan (I), (II).**—*Rep. For. exp. Sta. Meguro* 46, pp. 155–168, 1950; 59, pp. 57–64, 4 pl., 10 figs., 1953.

In the first paper in this series the author gives notes on six species of wood-rotting *Poria* newly recorded in Japan. *P. xantha* is widely distributed throughout the coniferous forests and causes decay of *Abies firma* and *Tsuga diversifolia*. *P. subacida* causes a stringy butt rot of *Picea jezoensis* and *P. glehnii*, the most valuable forest tree species in Hokkaido, and seriously damages *T. diversifolia*, *A. veitchii*, and *Larix kaempferi* in the high mountain forests of Honshu. *Poria eupora* causes a white rot of broad-leaved trees and *Fuscoporia prunicola* n.comb. (*P. prunicola*) [*R.A.M.*, 32, p. 527] a widespread white rot of *Prunus* spp. and *Alnus* spp. in Honshu. *Poria laevigata* produces an important trunk rot of *Betula ermanii communis* and *B. maximowicziana* [cf. ibid., 31, p. 359]. In culture this fungus was indistinguishable from *Phellinus* [*Fomes*] *igniarius*. *Poria tsugina*

causes white sap rot of living *Abies mayriana*, *T. sieboldii*, and *T. diversifolia* throughout Japan.

The second paper includes notes on five species of *Poria*, four of which are newly recorded in Japan. *P. lenis* causes a brown rot of fallen *Picea hondoensis* in Honshu. It is easily distinguished from other species by its soft texture and lunate spores. *Poria radula* was collected on wood of broad-leaved trees also in Honshu. *P. rixosa* is associated with a white rot of the bark of *T. diversifolia* on Mt. Fuji. *P. versipora* [*Bot. Mag., Tokyo*, 31, p. 362, 1917], widely distributed throughout Japan, causes a white rot of various broad-leaved trees, particularly evergreen and deciduous oaks. The bed-logs used for the cultivation of the shiitake mushroom (*Cortinellus edodes*) [see above, p. 535] are seriously damaged by *P. versipora* throughout the country.

Fuscoporia weirii n.comb. [*P. weirii*] causes root and butt rot of *T. diversifolia* and *A. mariesii* in the sub-alpine forests of Honshu, and attacks heartwood of *Picea jezoensis* in the primeval forest of central Hokkaido, causing a pinkish discoloration.

Robak (H.). **Dothichiza pithyophila (Cda.) Petr. the pycnidial stage of a mycelium of the type Pullularia pullulans (de B.) Berkhout.**—*Sydowia*, Ser. II, 6, 5–6, pp. 361–362, 1952.

At the Western Norway Forest Research Station, Bergen, the author recently demonstrated a genetic connexion between the pycnidia of *Dothichiza pithyophila* (identified by Dr. F. Petrak) [*R.A.M.*, 3, p. 305] on Norway spruce [*Picea abies*] and the mycelium of *Pullularia pullulans*. Of all the mycelia previously referred to the *P. pullulans* complex, *Hormonema dematioides* [ibid., 9, p. 77] agrees best with the isolates under observation and there seems to be little doubt of its identity with *D. pithyophila*, especially in view of the common habitat of both fungi on dead conifer wood in Scandinavia [ibid., 32, p. 442].

The perfect state of *D. pithyophila* remains unknown, since Kujala (*Commun. Inst. for. Finl.*, 38, p. 4, 1950) claims that *Cenangium ferruginosum* is definitely not implicated.

Josifović (M.). **Trametes radiciperda** и **Dasyscypha willkommii** у неким шумама Словеније. [*Trametes radiciperda* and *Dasyscypha willkommii* in some forests of Slovenia.]—Гласн. шум. Фак., Београд [*Bull. for. Fac., Beograd*], *1952*, 5, pp. 209–219, 1952. [French summary. Received 1953.]

During forest disease surveys in Slovenia, Yugoslavia, in the summers of 1950 and 1951 *Fomes annosus* [*R.A.M.*, 10, p. 631] was observed on roots and trunk bases of 23 per cent. of the 1,000 spruce trees blown down by a storm at the beginning of August, 1950, in the region between Jasenice and Kranjska Gora and on 27 per cent. of 477 trees growing on a 4-ha. site at Martuljak. Stump examinations of recently cut trees in these areas revealed a similar disease percentage in the apparently healthy trees. Control measures include rapid exploitation of diseased trees, gradual transformation of spruce into mixed forests, more intensive thinning of young stands, and destruction of ferns and heather which increase soil acidity.

Dasyscypha willkommii [ibid., 32, p. 406] was observed on 30 per cent. of 50- to 70-year-old and 50 per cent. of the 10- to 30-year-old European larches in the Sava Valley basin between Mojstruna and Planica. The acute disease development in this region is believed to be largely due to unfavourable climatic conditions, this being the extremity of the natural range of the tree, and also to the fact that no control has been attempted. The apothecia of the fungus are found rarely on old cankers but are numerous on younger trees and on branches of the older ones. By July and August some of them are completely formed with fully developed ascospores. Elimination of diseased trees or parts thereof, the choice of a more

suitable place climatically for larch cultivation, and the introduction of more resistant varieties and hybrids from the Sudeten Mountains are recommended.

Schultz (G.). **Bläueschutz bei Kiefern-Stamm- und Schnittholz.** [Protection of Pine logs and sawn timber against blueing.]—*Holzzentralbl.*, 79, 29, pp. 319–321, 8 figs., 1953.

A tabulated account is given of experiments at the Institute for Applied Mycology and Timber Preservation, Hann.-Münden, Germany, the results of which demonstrated the efficiency of sodium pentachlorophenol and three unnamed protectants in the control of [unspecified] blue-stain fungi on sawn pine timber [cf. *R.A.M.*, 32, p. 225]. The inhibiting concentrations for sodium pentachlorophenol were between 1·0 and 1·5 per cent. and for protectants I and II between 1·5 and 2, and 0·1 and 0·5 per cent., respectively. In other experiments they were between 0·25 and 0·5 per cent. for sodium pentachlorophenol and 0·05 and 0·075 per cent. for protectant III. The protection of logs presented greater difficulty and could be achieved only by the use of a 10 per cent. concentration. In view of the heavy depreciation in value caused by blueing, ranging from DM. 40 to 70 per cu. m. sawn timber, protective treatment at an inclusive cost of DM. 5 is considered to be well worth while. [An account of this work also appears in *Holz a. Roh- u. Werkst.*, 11, 2, pp. 66–67, 1953.]

Scheffer (T. C.) & Zabel (R. A.). **Storage of Beech logs and bolts in the Northeast.**—*Beech Utiliz. Ser., Ntheast. For. Exp. Sta.*, 2, 13 pp., 5 figs., 1951.

In the north-eastern United States stored beech logs and bolts are seriously affected during warm weather by [unspecified] decay and end-checking, and to a less extent by [unspecified] blue stain. Control measures against decay are not necessary for wood cut and stored in cold weather; during the rest of the year milling should take place a few weeks after cutting or the timber should be placed in water. Storage under wet hay is partially effective. Spraying is unsatisfactory. Ends should be coated with a protectant soon after cutting [*R.A.M.*, 32, p. 51]. Protection against blue stain [see preceding abstract] is usually unnecessary.

Cause and prevention of blue stain in wood.—*Tech. Note, Div. For. Path., U.S. Dep. Agric.* 225, 4 pp. 1952.

Brief notes are given in popular terms on the prevention and control of blue stain of timber caused by [unspecified] fungi [see preceding abstracts].

Butler (J. B.). **Dry rot. Part III.**—*Archit. (Build.) J.*, 7 pp., 10 diags., 1951. [Received August, 1952.]

An account is given of the technique for examining buildings for the presence of dry rot fungi (chiefly *Merulius lacrymans* [*R.A.M.*, 32, p. 158]) and methods of eradication and reconstruction [see next abstract].

Preservative treatments for timber used in buildings.—*Brit. Stand. Code* CP 112.110 (*1952*), 20 pp., 1952.

This code describes the recognized methods of preserving timber from fungal [*R.A.M.*, 32, p. 158] and insect attack and sets out recommendations for the structural use of preserved timbers in buildings.

Botelho (E. A.). **New preservatives of wood.**—*Bol. Inst. Technol. Rio de J.*, 2, 3, pp. 25–34, 1951. [Portuguese. Abs. in *Chem. Abstr.*, 47, 13, p. 6595, 1953.]

The resin secured from the destructive distillation of pine wood [cf. *R.A.M.*, 29, pp. 448, 524] was subjected to nitration. The product proved to be half as

expensive as ordinary fungicides and effective at a much lower concentration against malt agar cultures of *P[olystictus] versicolor* and other wood-destroying fungi.

MANGENOT (F.). **Recherches méthodiques sur les champignons de certains bois en décomposition.** [Systematic studies on the fungi in certain rotting woods.]—111 pp., 23 figs., 2 pl., Paris, Librairie Générale de l'Enseignement, 1952.

This is a fuller version of information already noticed from another source [*R.A.M.*, 32, p. 112].

WALLEN (V. R.) & SKOLKO (A. J.). **Treatment of vegetable seed of low germination.**—*Plant Dis. Reptr*, 37, 2, pp. 66–68, 1953. [Multilithed.]

In field experiments at the Division of Botany and Plant Pathology, Ottawa, to determine the influence of various seed treatments on the emergence of vegetable seeds [cf. *R.A.M.*, 32, p. 352] of low germination capacity (a result of long storage periods) panogen (4 oz. per 100 lb. seed) was non-injurious to most of the seeds tested except cabbage. The most outstanding effect was on beet [cf. ibid., 31, p. 264] where 97 per cent. emerged as against 42·6 of the untreated, the corresponding figures for squash being 59·8 and 10, tomato 73·8 and 41·5, spinach 53·5 and 21, peas 80·3 and 68·5, and cucumber 63 and 38. Phygon used on beet (8 oz. per 100 lb.), squash, and spinach (both at 4 oz.) gave 91·5, 45·5, and 67 per cent. emergence, respectively. Only spergon (8 oz.) produced a significant increase in emergence of broccoli and cabbage, i.e., 49 and 75·5 per cent. germination, respectively, compared with 36 and 65·5 per cent. for the untreated.

HEWITT (E. J.) & BOLLE-JONES (E. W.). **Molybdenum as a plant nutrient. I. The influence of molybdenum on the growth of some Brassica crops in sand culture. II. The effects of molybdenum deficiency on some horticultural and agricultural crop plants in sand culture.**—*J. hort. Sci.*, 27, 4, pp. 245–256, 257–265, 5 pl., 1952.

An efficient sand-culture technique [*R.A.M.*, 32, p. 29] developed at Long Ashton Research Station, University of Bristol, for the production of acute molybdenum deficiency in plants is described; purification methods and molybdenum contamination were checked by bioassay with *Aspergillus niger*. The order of relative susceptibility to molybdenum deficiency of *Brassica* as previously reported [ibid., 30, p. 255], was amended to Brussels sprouts (most susceptible), swede, cauliflower, rape, Hungry Gap kale, marrowstem kale, and savoy (least). Toxicity to cauliflower was not marked at 10 p.p.m. The visual symptoms of the deficiency are described and the relation of these effects of whiptail of cauliflower and broccoli [ibid., 32, p. 466] is discussed.

In the second paper a description is given of the response of legumes [ibid., 32, p. 531], vegetables, cereals, grasses, and other crop plants. Lettuce [ibid., 32, p. 418], tomato, and sugar beet were highly susceptible, being killed in a few weeks; clover, lucerne, and cereals came next; grasses and large-seeded legumes were least susceptible. Some of the implications of relative susceptibility and of the visual symptoms are discussed in relation to the role, distribution, and availability of molybdenum in crops.

YUKAWA (Y.). **The difference in nitrogen components of Radish due to the infection with virus. (Preliminary report.)**—*Bull. Fac. Agric. Yamaguti Univ.* 3, pp. 1–7, 1952. [Received May, 1953.]

Analysis of a sample of the Aokubi-Miyasige variety of Japanese radish, susceptible to [? mosaic] virus disease [*R.A.M.*, 31, p. 97; 32, p. 528], carried out at

Yamaguti University in November, 1951, showed that the total nitrogen content of infected plants was greater than that of healthy ones, but the ratio of amino-nitrogen to total nitrogen was less in infected plants. This may be due to the utilization of amino-nitrogen for virus protein.

Petruha (O. I.), Zhetvin (D. P.), Zhitkevich (E. N.), Pozhar (Z. P.), Skarbilovich (T. S.), Paly (V. F.), & Puchkov (V. G.). Вредители и болезни Сахарной Свеклы. [Pests and diseases of Sugar Beet.]—255 pp., 2 pl., 91 figs., 5 diags., 1 graph, Moscow, State Publishing House of Agricultural Literature, 1952. 4 roubles 50 copecks.

This semi-popular book, intended for the benefit of agronomists and active members of collective farms in the U.S.S.R., deals with over 60 pests and diseases attacking sugar beet during the growth period and in storage. Control measures (agrotechnical, chemical, biological, and mechanical) are described in detail and an annotated table, indicating various chemicals, their dosages and concentrations, and technique of application required for each insect or disease, is given.

Angell (H. R.). **Seedling blight. V. A new soil moisture relationship to the disease in Peas.**—*J. Aust. Inst. agric. Sci.*, 18, 2, pp. 99–101, 1952.

In further studies on seedling blight in Australia [*R.A.M.*, 31, p. 459; 32, p. 236 and next abstract] it was found that if peas were sown in air-dried soil from the local experiment station and watered only once, before or immediately after sowing, emergence was about 60 per cent. If, however, the same quantity of water was given in two applications, one a week or more before sowing, and the other immediately after, emergence was much less, being sometimes only 26 per cent.

It is concluded that these variations in percentage emergence were due to the influence of the different watering methods [ibid., 32, p. 531] on seedling blight caused by *Pythium* spp. [*P. ultimum* and *P. mamillatum*: ibid., 31, p. 459].

Angell (H. R.). **Seedling blight. VI. The effect of mixtures of unsterilized soils, and of reinfesting steamed soils, on seedling blight of Poppies and Peas.**—*Aust. J. agric. Res.*, 3, 2, pp. 128–136, 1952.

In further studies on seedling blight in Australia [see preceding abstract] pot experiments were carried out in which four soils of different seedling blight potential were used in various combinations to ascertain the effect of the mixtures on incidence of blight of peas and opium poppies (*Papaver somniferum*). The species of *Pythium* associated with the disease [*P. ultimum* and *P. mamillatum*: loc. cit.] were well distributed throughout the soils, three of which had never before been sown with these or related crops. When small amounts (4 gm.) of each of three soils were added in turn as inoculum to 2·5 kg. of each of the other two soils, stands of peas and poppies were generally unaffected, though one stand of peas was reduced. The amount of soil inoculum which caused seedling blight of peas in an unsteamed soil caused much greater reduction in pea stands in all four soils when they were steamed. Percentage stands of poppies were reduced in two soils.

When unsteamed soils of contrasting blight potential were mixed in three proportions the transition from good to poor stands of poppies was gradual, and tended to be directly proportional to the percentage of one of the components, whereas with peas the transition was abrupt, and a high percentage of blight was secured by incorporating in the mixture the soil which had a high disease potential to peas. The results indicate that the stand of peas was influenced mainly by the pathogens, whereas that of poppies was conditioned almost wholly by the general character of the soil.

It is concluded that growing seedlings of only one host plant may fail to reveal

the presence of a pathogen in a soil, as the seedlings of that host may not be susceptible in that soil. A pathogen is not essential to the production of seedling blight of poppies on Penrose or Belanglo soil. The general character of these soils will destroy poppy seedlings without the intervention of a pathogen, but *Pythium* spp. invade the roots of the dying seedlings and cause them to succumb more quickly. The character of these soils predisposes poppies, but not peas, to attack by *Pythium* spp. It appears that the factors influencing percentage stands are the different soils, changes induced in the chemical composition of soils by steaming, differences in pathogenicity of strains of the organism, and differences in host susceptibility induced in each host by different soils.

ANDERSEN (A. L.) & DEZEEUW (D. J.). **Pea seed treatment investigations. (Report of progress.)**—*Quart. Bull. Mich. agric. Exp. Sta.*, 35, 1, pp. 25–33, 1952.

Various pea seed treatments [*R.A.M.* 32, p. 531 and above, p. 600] were compared for their effectiveness against [unspecified] seed decay and damping-off [ibid., 32, p. 413] during 1949–51 at the Department of Botany and Plant Pathology, Michigan State College, East Lansing. Phygon XL (4 oz. per 100 lb. seed), phygon (2 oz.), and semesan (2 oz.) gave the best protection, while agrox, puratized 601, and puratized C-12-2525 (all at 2 oz.) and orthocide 406 (4 oz.) were effective in one season's trial and will be tested further. Dry and slurry treatments were equally satisfactory as were water and methocel slurries.

KERLING (L[UISE] C. P.). **Het overgaan met zaad van de Amerikaanse vaatziekte van Erwten.** [Seed transmission of the American vascular disease of Peas.]—*Tijdschr. PlZiekt.*, 58, 6, pp. 236–239, 1952. [English summary.]

In Holland the summer of 1951 was marked by a further increase in the number of pea-growing areas contaminated by *Fusarium oxysporum* f. *pisi* race 1 [*R.A.M.*, 31, p. 471]. In the summer of 1950 no symptoms of wilt appeared on plants of the Rondo variety produced by suspected seed sown in the previous spring in a field ploughed up from grass, but in 1951 seed from the same sample gave rise to scattered infections, indicating that the pathogen had been carried on or in the seed and had accumulated in the soil. After three consecutive sowings of suspected seeds previously treated with phygon and mercuric chloride, there was a considerable incidence of wilt in pots of steamed soil, the fourth sowing, this time of healthy seeds, also yielding a number of diseased plants. Evidently, therefore, the pathogen had been present in the testa all the time, but the cultivation of two or three pea crops was required to bring it to light in uninfested soil.

The estimate of 2 per cent. seed transmission in these experiments is much higher than that of workers in the United States [cf. ibid., 11, p. 555].

Research work and workers.—*Seed World*, 72, 11, pp. 80–81, 1953.

Seminole, a new bush bean [*Phaseolus vulgaris*] variety resistant to rust [*Uromyces appendiculatus*: *R.A.M.*, 31, p. 266], mildew [*Erysiphe polygoni*: ibid., 31, p. 366], and bean mosaic virus [loc. cit.], has been released by the Everglades Station, University of Florida.

DEZEEUW (D. J.) & ANDERSEN (A. L.). **Lima Bean seed treatment trials in Michigan, 1951–52.**—*Plant Dis. Reptr*, 37, 2, pp. 69–70, 1953. [Multilithed.]

In field seed treatment trials at East Lansing, Michigan, for the control of [unspecified] damping off and seed decay of Fordhook 242 lima beans [*Phaseolus lunatus*: *R.A.M.*, 32, p. 26] 11 fungicides were tested in 1951 and 13 in 1952. In 1951 arasan SF slurry (3 oz. per 100 lb. seed), ceresan M slurry (2 oz.), and liquid

panogen (2 oz.) gave, respectively, 60·4, 59, and 57·1 per cent. stand compared with 44·4 per cent. for the untreated. None of the other treatments was satisfactory. In 1952 all the treatments, except spergon slurry, gave significant control, the percentage stand ranging from 29·6 to 52·5 (ceresan M) compared with 21 for the untreated. Arasan compounds were less effective than in 1951. Orthocide 75 (dry or slurry, 2 oz.) and HL 609 (orthocide 75 plus lindane, 3 oz.) appeared very promising, giving 51·5 to 51·9 per cent. stand.

The experimental material L-224 (mercury zinc chromate) was injurious to the seed [ibid., 29, p. 370] and phygon XL caused a slight retardation in seedling development.

Athow (K.) & Probst (A. H.). **The inheritance of resistance to frog-eye leaf spot of Soybeans.**—*Phytopathology*, 42, 12, pp. 660–662, 1 fig., 1952.

At the Purdue Agricultural Experiment Station, Lafayette, Indiana, the F_2 segregations of six crosses between soy-bean varieties, viz., Lincoln (highly resistant) × Gibson (very susceptible), × Chief (fairly susceptible), × Hawkeye (very susceptible), and × Patoka (very susceptible), Patoka × Wabash (highly resistant), and Perry (fairly susceptible) × Lincoln, were studied under conditions favouring natural infection by *Cercospora sojina* [*R.A.M.*, 32, p. 531] in nursery plots interplanted with diseased Gibson. Resistance was shown to be due to a single major dominant factor. The symbols Cs, cs have been assigned to the gene pair involved.

Kilpatrick (R. A.) & Johnson (H. W.). **Fungi isolated from Soybean plants at Stoneville, Mississippi, in 1951–52.**—*Plant Dis. Reptr*, 37, 2, pp. 98–100, 1953. [Multilithed.]

Of the fungi isolated from all parts of soy-bean plants at Stoneville, Mississippi, in 1951–2, species of *Alternaria* [*R.A.M.*, 32, p. 166] and *Cladosporium* were most frequently encountered on both the vegetative and reproductive parts of the plant. *Sclerotinia bataticola* [*Macrophomina phaseoli*: loc. cit.] and *Phomopsis* [*Diaporthe phaseolorum* var.] *sojae* [cf. ibid., 32, p. 63] were isolated from the leaves as well as from other organs with which they are generally associated, while 18 species were obtained from seeds, many of which were taken from surface sterilized unopened pods.

Bakker (Martha). **Een bladvlekkenziekte van Prei, veroorzaakt door Pleospora herbarum (Pers.) Rabenh.** [A leaf spot disease of Leek caused by *Pleospora herbarum* (Pers.) Rabenh.]—*Tijdschr. PlZiekt.*, 59, 1, pp. 25–26, 1 fig., 1953. [English summary.]

Heavy losses were caused in Dutch leek crops during the wet season of 1951 by *Pleospora herbarum* [cf. *R.A.M.*, 10, p. 767; 31, p. 164], which forms on the leaves oval, dry, brown to white spots, often surrounded by wet, rotten tissue. Under very humid conditions perithecia develop in profusion after about two months. Spraying with copper-containing compounds is suggested [ibid., 3, p. 500; 18, p. 496].

Di Caro (S.). **Il 'mal vinato' con special riguardo a quello dell' Asparago.** [Violet root rot, with special reference to that of Asparagus.]—*Ann. Sper. agr.*, N.S., 6, 5, pp. 1389–1397, 1 col. pl., 2 figs., 1952. [English summary.]

After succinctly reviewing the literature on violet root rot (*Helicobasidium purpureum*) of different hosts, the author states that the disease is very prevalent on asparagus in Italy [*R.A.M.*, 5, p. 208; 6, p. 395]. The crop is grown chiefly in the north and centre, where the climatic conditions favour early cropping. The disease is found in Lazio, Le Marche, Emilia, and Romagna, and in recent years

has been reported from Ferrara, Cesena, and Baricella (Bologna). In Emilia and Romagna it appears to be spreading, probably as a result of the very wet weather experienced in recent years.

Control is recommended by the usual methods [ibid., 6, p. 593]: the soil should be kept acid and if necessary sterilized, preferably with carbon disulphide (300 gm. per sq. m.) or formaldehyde (60 gm. per sq. m. in solution), and rotation should be practised.

GERSTNER (W.). **Untersuchungen über die Biologie des Erregers des Sellerieschorfes (Phoma apiicola Klebahn).** [Studies on the biology of the agent of Celery scab (*Phoma apiicola* Klebahn).]—*Wiss. Z. Martin-Luther-Univ.*, 11, 4, 83–126, 24 figs., 13 graphs, 1952.

This amplified version of the author's studies on celery scab (*Phoma apiicola*) at the Martin Luther University, Halle, Germany, comprises, in addition to information already presented from another source [*R.A.M.*, 32, p. 230], observations on a large-spored species of *Phoma* also concerned in the etiology of the disease, the spores of which measure 4 to 7 by 1·5 to 3 μ and the pycnidia and mycelium are olive-brown to grey. The optimum temperature for spore germination and mycelial growth is 25° C.

VENKATAKRISHNAIAH (N. S.). **Blight of Amaranthus paniculatus L. caused by Alternaria.**—*Phytopathology*, 42, 12, pp. 668–669, 1952.

In December, 1946, the flowers of *Amaranthus paniculatus*, cultivated for the seed commonly used as a food in India, were severely attacked at Bangalore by an *Alternaria* which also caused slight damage to the leaves and stems. The blackened flowers on the central spike presented a smutted appearance, the bracts, sepals, stigma, and ovary all being invaded by the mycelium. The spots on the leaves were circular and brownish to dark brown, while the stem lesions were irregular, dark, and slightly sunken. The hyphae ranged from 4 to 8 μ in width. The brown conidia on the inflorescences measured 31·5 to 71 by 12 to 20 μ (including the beak) and were provided with three to nine transverse septa and one longitudinal septum, the beak being 10 to 41 μ in length and containing one to three septa. The conidiophores were 39·5 to 81·5 μ long with three to seven septa.

The fungus grew well on onion, potato dextrose, and oat agars, forming concentric zones and turning from dark green to black with age. The dense aerial growth produced by the mycelium on oat and French bean agars was chromogenic on rice and onion. Sporulation was more profuse on onion agar than on any of the other media used. The conidia were dark green with three to eight transverse and one to three longitudinal septa. Germination occurred in two hours in sterile distilled water. The pathogenicity of the organism was established by inoculation experiments with monoconidial cultures.

The conidia of the fungus agree closely with those of *Macrosporium amaranthi* Peck (Sylloge Fungorum, 14, p. 1096). Following Elliott (*Amer. J. Bot.*, 4, pp. 439–476, 1917) and Wiltshire [*R.A.M.*, 13, p. 327], the author considers the fungus would more properly be placed in *Alternaria*, and *A. amaranthi* (Peck) n.comb. is therefore proposed.

BELS-KONING (H. C.) & DE JONG-OLTHOF (K.). **Bruine vlekken op Champignons ten gevolge van aantasting door Pseudomonas tolaasi Paine.** [Brown spots on Mushrooms as a result of infection by *Pseudomonas tolaasi* Paine.]—*Tijdschr. PlZiekt.*, 58, 6, pp. 243–246, 1 pl., 1952. [English summary.]

In order to obtain artificial infection on mushrooms by *Pseudomonas tolaasi* [*R.A.M.*, 30, p. 555] at the Mushroom Cultivation Research Laboratory, Houthem,

Holland, the pathogen had to be grown on media enriched with meat or mushroom extracts. The latter were extracted from pilei and pure culture mycelium with hot or cold water. In nature old mycelium in the casing soil and stumps left on the beds may serve as sources of infective material, which is extracted and splashed by the water used for sprinkling the beds. The incidence of brown blotch may be reduced by trashing the beds. *P. tolaasi* has not proved amenable to bactericidal treatment in the author's tests.

Casimir (J.) & Trzcinski (T.). **Contribution à l'étude du métabolisme azoté dans les champignons. I. Répartition des acides aminés dans Agaricus hortensis var. alba.** [A contribution to the study of the nitrogen metabolism in fungi. I. Assessment of amino acids in *Agaricus hortensis* var. *alba*.]—*Bull. Inst. agron. Gembloux*, 20, 3–4, pp. 178–184, 1952. [Received June, 1953.]

At the State Agricultural Institute, Gembloux, Belgium, estimation by paper chromatography of the relative proportion of the different amino acids present in the various parts of the cultivated mushroom at different stages demonstrated that the most important were alanine, glutamic acid, and γ aminobutyric acid.

Fogliani (G.). **Segnalazione di una malattia della Vite referibile a degenerazione infettiva (arricciamento, roncet, ecc.) a San Colombano al Lambro (Milano).** [Report of a Vine disease attributable to infective degeneration (leaf curl, roncet, etc.) at San Colombano al Lambro (Milan).] —*Notiz. Malatt. Piante, 1952*, 20, pp. 32–35, 1952. [English summary, p. 51. Mimeographed.]

Notes are given on the symptoms and local distribution of a condition of vines, considered to be a form of infectious degeneration [court-noué: cf. *R.A.M.*, 32, p. 170], observed at S. Colombano al Lambro, Milan, Italy, in 1951.

Frangopoulos (A. M.). **Control of some Vine diseases and pests in Egypt.**—*Plant Prot. Overseas Rev.*, 3, 4, 2 pl., pp. 13–18, 1953.

This paper includes notes on the incidence, importance, and control in Egypt of the vine mildews *Peronospora* [*Plasmopara*] *viticola* [C.M.I. map No. 221] and *Oidium* [*Uncinula necator*]. *P. viticola* is an endemic fungus, generally appearing every year from July onwards, especially in the Northern Provinces of lower Egypt. If not combated in time it may have a disastrous effect on the crop. Winter treatment includes the hoeing or harrowing in deeply of all fallen leaves, scraping off and burning the loose bark, and painting the stems with 5 per cent. Bordeaux mixture. Summer treatment comprises four sprays with 0·4 per cent. perenox or 1 per cent. Bordeaux, the first being applied when the shoots are 15 to 20 cm. long and subsequent ones at 15-day intervals and repeated after rain. These sprays are particularly beneficial to late varieties such as Roumi Ahmar; they also protect against minor diseases.

Roumi Ahmar is also highly susceptible to *U. necator*. It is controlled by spraying every 15 days until maturity, but not in hot weather, with 1 per cent. wettable sulphur incorporated in the copper spray.

Pieri (G.). **Sull' uso del calendario d'incubazione della Peronospora della Vite nella provincia di Treviso.** [On the use of the incubation calendar of the Vine *Peronospora* in the province of Treviso.]—*Ann. Sper. agr.*, N.S., 6, 6, pp. 1577–1586, 2 graphs, 1 map, 1952. [English summary.]

During 1951, Baldacci's method of using an 'incubation calendar' [*R.A.M.*, 30, p. 505] for forecasting outbreaks of vine mildew (*Plasmopara viticola*) [ibid., 32, p. 468] was applied for the first time in the province of Treviso, Italy. As the existing local data were insufficient for the determination of the duration of incubation, this was calculated from Clementi's table (Convegno internazionale di studi

viti-vinicoli di Torino, 1949), based on the average temperatures and pathological observations carried out locally. The incubation periods were thus estimated and treatments accordingly recommended every ten days from the end of April to the end of July; with few exceptions they proved to be accurate.

The results obtained indicate that further work is necessary in order to determine the effect of local climatic conditions on the duration of the incubation period. Continuous low temperatures and lack of sufficient meteorological data made it impossible to indicate the duration of the incubation period of the first infection in certain communes. In Mogliano Veneto and Mansué rain fell during the third ten days of April, and oil spots appeared between the 10th and the 12th May. In Salgareda, Ponte di Piane, and Spresiano the first spore emission occurred between 16th and 17th May, which agreed perfectly with the estimate for all Marca Trevigiana; in these localities, as in Conegliano, climatic conditions suitable for oospore germination occurred on 2nd May. In Piene di Soligo and Castelfranco Veneto the first spore emission occurred four to five days later than was predicted.

McKenzie (W. M.). **An investigation of the suitability of sawdust for packing Grapes.**—*C.S.I.R.O. For. Prod. Div. Sub-Proj.* U.16-1, *Progr. Rep.* 2, 19 pp., 7 figs., 1953. [Abs. in *Abstr. Publ. Pap. & List Transl.*, 1, 6, p. 4, 1953.]

Ohanez grapes packed in band-sawn and circular-sawn sawdusts and kept in cold storage at the Division of Food Preservation, Homebush, New South Wales, showed no more degradation [*R.A.M.*, 30, p. 336] and taint than those stored in granulated cork. Degrade was reduced by adding $\frac{3}{4}$ oz. metabisulphite [ibid., 32, p. 468] per cu. ft. packing material.

Fry (P. R.). **Occurrence of Lucerne-mosaic virus in New Zealand.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 4, pp. 320–326, 6 figs., 1952.

Lucerne mosaic virus [*R.A.M.*, 13, p. 518; 31, p. 319] was found to be responsible for virus symptoms on white and red clover plants in trial plots at Palmerston North in 1950 and on lucerne at Lincoln, New Zealand, in 1951. The diagnosis was confirmed at the Plant Diseases Division, Auckland, on the basis of physiological properties and cross-protection tests. On naturally infected tobacco, bean (*Phaseolus vulgaris*), broad bean [ibid., 32, p. 82], and cucumber symptom reaction was the same as that described by Zaumeyer [ibid., 17, p. 721]. At least three strains of the virus were isolated from clover. Strain B caused severe disease on Tallarook subterranean clover and Montgomery red clover, while strain A failed to infect either host. Both strains, however, produced etched ring spot local lesions, systemic etching, and mottle on tobacco; necrotic local lesions only on French beans; the same plus systemic necrosis on broad bean; mottle on white clover; vein-clearing, etching, and mild mottle on Mount Barker subterranean clover; and vein necrosis, leaf distortion, and stunting on Broad Red red clover. With the exception of broad bean and subterranean clover (both varieties), host reaction to strain C was quite different. Tobacco developed chlorotic lesions with mild mottle, French beans vein necrosis which spread to the petioles and stems, and red clover (both varieties) transient vein-clearing. This suggests a closer relation between A and B strains than between the others. Similar results were obtained in cross-protection tests on White Burley tobacco. Strains A and B protected against each other but neither protected against C, which did, however, do so against A and B.

Maramorosch (K.). **Studies on the nature of the specific transmission of Aster-yellows and Corn-stunt viruses.**—*Phytopathology*, 42, 12, pp. 663–668, 1952.

Negative results were obtained at the Rockefeller Institute for Medical Research, New York, in experiments on the transmission of the aster yellows [*R.A.M.*, 31,

p. 475; 32, p. 433] and maize stunt [ibid., 31, p. 318] viruses, each by the vector of the other virus, *Dalbulus maidis* and *Macrosteles divisus*. Moreover, non-vectors that acquired the viruses by feeding on diseased plants were not rendered infective by puncturing their gut walls [cf. ibid., 12, p. 686], nor could the viruses be recovered from insects injected with them. On the other hand, when *D. maidis*, *M. divisus*, and *Agallia constricta* acquired the viruses by feeding, they could be recovered after 21 days by injection of their body fluids into the proper vectors. In each of three serial passages (by injection) of maize stunt virus in *D. maidis* with a 1 in 100 dilution at each transfer, some insects became infective, but similar experiments with both viruses in non-vectors were unsuccessful, presumably because multiplication (a prerequisite condition for specific biological transmission of the viruses tested) was inadequate or lacking.

Köhler (E.). **Gomphrena globosa als Wirtspflanze verschiedener Mosaikviren.** [*Gomphrena globosa* as host plant of various mosaic viruses.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 5, 2, pp. 21–22, 6 figs., 1953.

At the Virus Research Institute, Celle, Germany, *Gomphrena globosa* [*R.A.M.*, 32, p. 144] reacted specifically to inoculation with a virus from *Sonchus arvensis* and tobacco tentatively referred to potato stem-mottle [ibid., 32, p. 402 and below, p. 612] and with tomato spotted wilt virus.

Du Toit (J. J.). **An improved glass spatula for inoculating plants with viruses.**—*Tijdschr. PlZiekt.*, 59, 1, pp. 23–24, 2 figs., 1953.

An objection to the use of the forefinger for virus inoculation is the difficulty of disinfection when working with several viruses during a day, especially highly infectious ones. At the Plant Virus Research Unit, Molteno Institute, Cambridge, a ground glass spatula with a reservoir to contain the inoculum was devised. One end of a piece of glass tubing, 10 to 12 cm. by 6 mm., was flattened and bent to a convenient angle. At the 'heel' a small tube was pulled out and ground off to the same level, or a little shorter than the under surface of the flat part, which was also ground. Any quantity of inoculum can be used, from a drop to the maximum capacity of the tube and it can also be applied very sparingly. Application is as speedy as with the finger. Even very sensitive leaves were inoculated effectively without any perceptible signs of mechanical damage when supported on a folded piece of soft paper and rubbed very gently with the abrasive.

Williams (P. H.), Ebben (M[arion] H.), Hack (Judith), Read (W. H.), Smith (R. J.), Howles (R.), Owen (O.), Messing (J. H. L.), & Massey (D. M.). **Plant diseases. Chemical investigations. Growers' notes.**—*Rep. exp. Res. Sta. Cheshunt, 1951*, pp. 22–40, 78–83, 85–87, 4 pl., 3 graphs, 1952.

In this report [cf. *R.A.M.*, 31, p. 222] P. H. Williams and Marion H. Ebben describe further studies on brown root rot of tomato, which indicated that steaming appeared to be the most effective method of destroying the fungi in the soil [ibid., 31, p. 297], its effect on the general level of bacterial activity being less marked. *Penicillium* spp. and *Mucor* spp. were regularly isolated from soil round tomato plants and the inner and outer rhizospheres in comparatively large numbers throughout the season, *P.* spp. being more numerous in unsteamed soil, and *M.* spp. in steamed. They were less frequent in the inner rhizosphere. *Myrothecium roridum* occurred most commonly in unsteamed soil, but was less prevalent in the rhizosphere than elsewhere, particularly in steamed soil. *Trichoderma viride* [ibid., 30, p. 592] was isolated most frequently from the outer rhizosphere in both steamed and unsteamed soil, but the numbers isolated were usually at variance with the number of records of its appearance. With a freely sporing fungus such as *T.*

viride the number of colonies on a dilution plate does not necessarily give an accurate picture of its activity in the soil; this fungus is probably more active in the rhizosphere of plants in steamed soil.

Fusarium spp. occurred more often in the rhizosphere in the steamed plot and were found regularly in the unsteamed at the end of the season. *Volutella ciliata* also preferred the rhizosphere in steamed soil. It tended to occur earlier than *F.* spp. and was not found at the end of the year. Fungus K was first isolated from steamed soil in April and was most common from that source. It was not found in unsteamed soil until June, and was not isolated from the outer rhizosphere until August, after which it occurred fairly regularly. Species of *Chaetomium* were uncommon but tended to be most frequent in the inner rhizosphere. *Colletotrichum atramentarium* was the only species isolated which had a marked preference for the root surface, appearing early in June in the inner rhizosphere in unsteamed soil and at the end of the month in the steamed, and being one of the dominant species there. Apparently it cannot spread readily through the soil and probably survives only in decaying roots.

In the root tissues *C. atramentarium* and *V. ciliata* were more common in steamed soil, while fungus K and *F.* spp. were more frequent in unsteamed, and in both soils were obtained earlier from root tissues than from the surface. It would appear that *C. atramentarium* and *F.* spp. are the fungi most likely to invade the roots, while *Chaetomium* spp. and (in steamed soil) *V. ciliata* might do so. Fungus K may be present in diseased root tissue only as a secondary saprophyte.

If the living root always became infected directly from the soil on its surface, the invading fungus could probably be isolated from the surface before it was found in the tissue, but this does not seem to occur. It is, however, possible that primary root infection early in the season may be more likely when a living root grows in contact with organic debris harbouring a potential pathogen. This would explain the early appearance of *Colletotrichum atramentarium* and K in the roots, particularly in unsteamed soil, as both overwinter in root debris which seemed to persist longer in the unsteamed plot.

In further studies on tomato stem rot (*Didymella lycopersici*) [ibid., 31, p. 222] by P. H. Williams and Judith Hack the evidence obtained suggested that infection was air-borne, the presence of spores in the air being confirmed by exposure of plates. Only in one glasshouse did there appear to be any spread after initial infection. The disease has always been very localized at Cheshunt, some biological or cultural factor evidently limiting dissemination. Straw mulches were not of great importance in assisting spread. The fungus was found in tomato stems 14 in. above a lesion $3\frac{1}{2}$ in. long and 6 in. above a lesion $\frac{1}{2}$ in. long, affecting only one side. In general, it was present 4 to 7 in. above the lesion. Spores placed 4 in. below the soil surface in pots caused no infection [loc. cit.]; one plant out of five became infected in the series with spores 2 in. deep and all in surface-inoculated pots. When soil cultures of *D. lycopersici* incubated for five weeks at laboratory temperature were kept at 80°, 61°, and 40° F. and then plated, there was again a marked drop in the numbers of colonies from those at 80° [loc. cit.].

In tests of methods for isolating the fungus from soil a small proportion of spores germinated in tomato juice after 48 hours in 10 per cent. copper sulphate. The addition of tomato juice to copper sulphate solutions also protected *T. viride* and *Penicillium* spp. against copper sulphate. When the possibility of eliminating undesired organisms by soil heating was tested, it was ascertained that the thermal death point of *D. lycopersici* mycelium was about 111° (ten minutes' exposure) and of the spores about 115°. This is lower than for most fungi and bacteria. Shaking an aqueous mixture of *D. lycopersici* and *Penicillium* spores with paraffin did not separate the 'dry' spores of the latter from the 'slime' spores of the former. Watering similar spore suspensions and mycelial fragments on to the surface of

a column of wet sand in a narrow glass tube [cf. ibid., 29, p. 532] eliminated more *P.* spores, but the results depended on various factors, including the size of the sand particles, the length of the column, and the amount of water in the sand. Separation of the two fungi was effected when green tomatoes were inoculated with a mixed spore suspension (water or soil), *D. lycopersici* outgrowing *Penicillium*. It would, however, be difficult to adapt this method to quantitative work, as 100 per cent. infection did not occur when only a few spores were present in the suspension.

On plates of Sleeth's medium [ibid., 25, p. 231] the numbers of bacteria were markedly reduced, while those of *D. lycopersici* were not affected. The growth of *Mucor* spp. was retarded. The addition of 0·0067 per cent. rose bengal to Sleeth's medium eliminated actinomycetes, while the reduction of sugar in this modified medium largely increased the number of fungi isolated from unsterilized soil. When *D. lycopersici* spores were added to unsterilized soil, the number of colonies was inversely proportional (within limits) to the sugar content. Soil suspensions with equal numbers of spores produced comparable numbers of *D. lycopersici* colonies at 63° whether the soil was unsterilized or sterilized, whereas at 70° the numbers from the former were much smaller.

Further investigations of the activities of quinonoid and related compounds [ibid., 31, p. 340] by W. H. Read and R. J. Smith showed that oximation of *p*-quinones appears to reduce their fungitoxic and phytotoxic activities considerably. The presence of chlorine in the 5:8- positions of 1:4-naphthoquinone enhanced fungitoxicity slightly and greatly reduced phytotoxicity, while 2:3-dichloro-1:4-naphthoquinone was rather more toxic to tomato plants than the 6-nitro derivative; 1:2-naphthoquinone had only half the potency of 1:4-naphthoquinone. The chlorohydroquinones were much more toxic than hydroquinone to spores of *F. culmorum* without being more phytotoxic, whereas the reverse was true of two corresponding nitro derivatives. The diacetyl derivative of 2:5-dichlorohydroquinone, far less toxic to *F. culmorum* than the parent compound, was only slightly inferior to the latter at pH 5 against *Alternaria circinans* [*A. brassicicola*] and *D. lycopersici*. The diacetyl derivative of 2:3:5:6-tetrachlorohydroquinone, however, was much less toxic to *A. brassicicola* and *D. lycopersici* than the parent compound and 2:5-dichlorohydroquinone diacetate. These chlorohydroquinones and diacetates were less phytotoxic to tomato plants than the corresponding quinones, while the 2:5 diacetate was less phytotoxic than the parent compound. The toxicity of 2-iodo-1:4-diaminonaphthalene to spores of *F. culmorum* was about half that of 2-iodo-1:4-naphthoquinone, while 4-amino-3-bromo-2-nitro-1-naphthol, one of the most active of the compounds tested (at pH 5) against this fungus, *D. lycopersici*, and *A. brassicicola*, was rather phytotoxic. Replacement of bromine by iodine greatly reduced fungitoxicity.

In the second part of this paper W. H. Read describes preliminary trials with fungicides for the control of cucumber mildew (*Erysiphe cichoracearum*). The most outstanding was 2:3-dichloro-1:4 naphthoquinone, but further tests are necessary as it is somewhat phytotoxic. Zineb was the only dithiocarbamate to deserve further trial.

R. Howles found that tomato seeds containing tobacco mosaic virus only, when heat-treated in a normal atmosphere for four hours at 150° gave seedlings 50 per cent. heavier than those from untreated infected seed [ibid., 31, p. 223]. Analysis of data from heat treatments for various periods (mean temperature 142·5°) showed that in 5·5 days the virus content was halved, and that in 22 days it would be reduced to 6·25 per cent. Seed should be heat-treated for one month. For Winter Crop lettuce seed containing lettuce mosaic virus, treatment in a saturated atmosphere at 115° and 125° was deleterious, but in a normal atmosphere at higher temperatures the injurious effect was less noticeable. Short periods of heating at lower temperatures increased the weight of the seedlings. The higher

the temperature the greater the percentage of infected plants, though a minimum percentage of infected plants appeared to be associated with a definite duration of heat treatment. One month after sowing in autumn and winter no further mosaic symptoms appeared; possibly, strict roguing during that period would eliminate most of the disease. During one year infected seed became almost free from virus.

Chrysanthemums affected by chrysanthemum mosaic virus [cf. ibid., 32, p. 559] showed no foliar symptoms definite enough for diagnostic purposes; flower and leaf symptoms [cf. ibid., 32, p. 483] on a number of varieties are described. On *Nicotiana glutinosa* the virus produces a mottle followed by conspicuous distortion, whereas ordinary cucumber mosaic virus causes only mottle. On *Datura stramonium* circular spots developed, whereas cucumber mosaic causes a mosaic mottle. *N. glutinosa* is the best test plant, developing a mottled appearance in winter at low temperatures in seven weeks and at higher temperatures in five; in summer the period is ten days, and in autumn three to four weeks.

In nutrient deficiency experiments by J. H. L. Messing and O. Owen White Maytime and Spectrum perpetual-flowering carnations [cf. ibid., 20, p. 205] without nitrogen were characterized by a regular dying of the old leaves from the tips backwards into the stem. In the absence of phosphorus the plants were stunted, the shoots thin, the flowers small, and the old leaves died at an abnormal rate and in an irregular manner, generally starting at the base. Potassium deficiency was shown in White Maytime by reduction in growth rate and thin shoots; the tips of the middle leaves lost colour and the distal half suddenly became covered with pale, necrotic, sunken spots of irregular shape and size, which enlarged and coalesced. The middle and bottom leaves died. Further irregular dying-back of the leaves occurred but became arrested or retarded as it approached the base, with the result that the internodes and leaf bases remained green. No spots developed on Spectrum. Both varieties produced thin, weak stems and poor blooms. In most cases the stems collapsed at about the third internode from the top and wilted without the buds opening properly. Calcium deficiency caused tipburn on the young leaves of both varieties, a definite constriction occurring at a certain distance from the tip. Later the whole tip became narrow and was often bent over. The growing point died about four weeks after the appearance of the first symptoms; collapse continued down the stem, death occurring by stages. Spectrum developed a narrow red-violet border between the dead tip and the rest of the leaf. Without magnesium the plants turned yellow and growth became arrested. Most of the middle leaves of White Maytime developed a narrow, regular, necrotic band across the leaf near the base. On some stems six consecutive pairs of leaves collapsed simultaneously, the bands remaining unaltered. In White Maytime 'no sulphur' treatment was marked by stem stiffness, reduced rate of growth, and stunting, followed by chlorosis of the tops, the whole plant turning bright green. Without boron Spectrum developed tip scorch of the young leaves. Later all growth ceased and in White Maytime death of all growing points soon followed, Spectrum resisting longer. Stiffening of the flower stems and distortion and transparency of the edges of the outermost petals were noted. On Spectrum the petal edges became almost black and the flowers were untidy and ragged.

D. M. Massey and O. Owen report that an application of sulphur at the rate of 4 oz. per sq. yd., corresponding to approximately 0·2 per cent. in the soil, corrected lime-induced manganese deficiency in glasshouse roses [ibid., 31, p. 223].

P. H. Williams summarizes nine years' work on tomato stem rot (*D. lycopersici*) at Cheshunt under the headings: symptoms, other hosts, sources of infection, effect of cultural conditions, and control.

Biologische Zentralanstalt der Deutschen Akademie der Landwirtschaftswissenschaften zu Berlin. Pflanzenschutztagung in Berlin 12. bis 14. März 1952.

[Biological Central Institute of the German Academy of Agricultural Sciences, Berlin. Plant Protection Conference in Berlin, 12th to 14th March, 1952.]—164 pp., 31 figs., 5 diags., 6 graphs, Deutscher Bauernverlag, Berlin, 1952.

The following are among the papers presented at the above-mentioned conference [cf. next abstract and *R.A.M.*, 32, p. 539]. E. Reinmuth (pp. 13–19) summarizes and discusses the information contained in 16 contributions to the literature on the relation of meteorogenous factors to plant diseases.

The possibilities of a prognosis of fruit diseases and pests are discussed by G. Friedrich (pp. 20–25). The efficacy of ground sprays against apple scab [*Venturia inaequalis*: loc. cit.] depends on correct timing; the operations must be concluded before the fallen leaves, bearing ripe perithecia, become saturated by rain. One approach to the problem is based on a consideration of the factors favouring the development of epiphytotics in a given locality. Thus, a prolific growth of weeds in the spring portends a high incidence of downy mildew [Peronosporales] and fruit scab [*V.* spp.]. Again, *Phytophthora* [*infestans*] will be widespread on potatoes in a wet summer when scab [*Actinomyces scabies*] is hardly noticeable.

From the University of Rostock, Mecklenburg, Gerda Rohde (pp. 40–44) describes cultural studies on and inoculation experiments with *Sclerotinia laxa* f. *mali* and *S. fructigena* on pome fruits, particularly apple [ibid., 21, p. 460]. The former was shown to be a perthophyte *sensu* Münch [ibid., 9, p. 47], preferring weakened or injured tissue, whereas the latter is a parasite. Thus, the rapidly fading blossoms provide the most suitable material for the establishment of the initial phase of infection by *S. l.* f. *mali*, though a direct attack on the young branches is not excluded. *S. fructigena* occasionally proceeds from the rotted fruits to the contiguous wood, on which it causes the same symptoms as *S. l.* f. *mali*. Even macroscopically, however, the firm-looking, pale yellow conidial cushions of the former species are readily distinguishable from the loose, ash-grey mats of the latter.

G. Schuster (pp. 65–70) reviews previous attempts to devise expeditious methods for virus detection in potato tubers [cf. ibid., 31, p. 75] and describes his preliminary experiments in the application of potassium permanganate, bismuth nitrate, and Fehling's reagent for this purpose, the last being the most promising. Two methods of establishing its accuracy were adopted. The first involved the examination of clones of tubers, separately harvested and stored, from plants which had been rated for health during the summer. The reaction distinguished five categories, ranging from (1) a pure yellow stain characteristic of completely healthy tubers through varying proportions of a violet admixture to (5) exclusively violet. To group (1) were assigned 83·4 per cent. of the sound tubers procured from a healthy (non-degenerating) zone, while 10·6, 2·6, 1·7, and 1·7 per cent. fell, respectively, into groups (2), (3), (4), and (5). From a zone conducive to degeneration the percentages in the same five groups were 14·6, 6·9, 10·1, 14·6, and 53·8 per cent., respectively. Of the tubers infected by potato mosaic and crinkle [X+A] viruses the corresponding figures were 7·4, 9·3, 11·1, 9·3, and 62·9 per cent., while for material with a mixed infection of leaf roll and streak [? virus Y] viruses they were 5·1, 6·7, 6·4, 5·9, and 75·9 [see next abstract].

In the second (counter-trial) method, tubers of diverse origin in an unknown state of health were tested before planting, the results being compared with the condition of the plants produced. In general, the outcome of the counter-check confirmed the data obtained by the first procedure.

M. Sy (pp. 71–80) presents up-to-date information on the steadily increasing use of wettable sulphur fungicides [ibid., 32, p. 540] in western Germany, where they have almost entirely superseded liquid colloidal sulphur. Official recognition was first accorded in 1949, when two brands were approved, the numbers of sanctioned preparations increasing each year until 1952, when 14 brands of wettable sulphur 80 (70 to 80 per cent. sulphur, with particles exceeding 1 μ and with less exacting

requirements for suspensibility than liquid colloidal sulphur) and five solid colloidal sulphurs (50 per cent. sulphur, particles under 1 μ) were released.

Practical experience in the vineyard has demonstrated the efficiency of colloidal sulphur and the failure of the coarse dusting types in the control of *Plasmopara viticola* at the critical temperature of $\pm 20°$ C. [ibid., 10, p. 432, *et passim*]. Many more outdoor experiments with wettable sulphurs will be necessary to determine the correlation between particle size and toxicity to vine *Oidium* [*Uncinula necator*], but it is already clear that those of a fineness equal to the liquid preparations are superior to the latter on account of their higher sulphur content (half as much again).

The wettable sulphur concentrations originally recommended against *V. inaequalis* [ibid., 32, pp. 539, 540] were unduly low and the treatment proved ineffectual in severe outbreaks, but an increase to 1 per cent. has resulted in raising the wettable sulphurs to equality with standard fungicides. The wettable sulphurs, moreover, are the only preparations giving any promise of success in the campaign against apple mildew [*Podosphaera leucotricha*: loc. cit.].

Jahresbericht der Biologischen Bundesanstalt für Land- und Forstwirtschaft in Braunschweig 1951. [Annual report for 1951 of the Biological Institute for Agriculture and Forestry at Brunswick.]—100 pp., 10 figs., 1 diag., 1 graph, 1 map, 1952.

The following are among the items of phytopathological interest in this report [cf. preceding abstract], besides those already noticed from other sources. Samples of wheat brown rust (*Puccinia triticina*), numbering about 90, tested by K. Hassebrauk (pp. 32–33) in 1950 [*R.A.M.*, 29, p. 92] yielded six physiologic races, mostly new to Germany.

H. Rabien (p. 60) reports that a large proportion of the 327 hybrid wheat progenies tested for their reactions to races 2, 7, 9, 44, and 54 of yellow rust (*P. glumarum*) [ibid., 31, p. 110] displayed considerable or, in part, complete resistance. The same author, with A. Noll (pp. 60–61), noted the increased prevalence, among the 40 samples submitted for inspection, of the already widespread race 7.

In E. Köhler's further tests (p. 34) on the reactions of German potato varieties to potato virus X [ibid., 31, p. 202; 32, p. 143], Fortuna alone proved to be hypersensitive to Ro 7 and all the other strains used.

A virus discovered by E. Köhler (p. 34) producing an irregular ring pattern of chlorotic spots on the leaves of *Sonchus arvensis* was transmissible by rubbing to tobacco, potato, and *Gomphrena globosa*. Its thermal death point was found to lie between 76° and 79° C. and it appears to be closely akin to the potato stem-mottle virus affecting tobacco in Holland [ibid., 32, pp. 145, 607]. A virus disease almost identical with the foregoing was observed by O. Bode on field tobacco plants. *S. arvensis*, therefore, may well act as a carrier of the soil-inhabiting potato stem-mottle virus.

O. Bode's tests (pp. 35, 36) by the leaflet method on nine conditionally approved potato varieties and 21 selections awaiting official recognition revealed fairly extensive mild infection by potato virus X, while the incidence of virus A was low, and only one selection harboured virus Y. Field tests on 14 potato varieties approved since 1945, for susceptibility to virus diseases in five localities favouring degeneration showed that, in general, the percentages of infection were greatest at Münster and Bonn, leaf roll predominating. Aquila, Panther, and Cornelia were particularly resistant to leaf roll in all districts, but Panther proved highly susceptible to virus Y (86 per cent. infection at Bonn). More than average resistance to streak [potato virus Y] was shown by Aquila, Biene, Bona, Cornelia, Frühperle, Immertreu, Magna, Sieglinde, Sommerkrone, and Urtica, and to mosaic (presumably virus A) by Fichtelgold, Heida, Immertreu, Marktredwitzer, Frühe, Panther, and Urtica.

Leaf roll and virus Y, in particular, were limiting factors in production [cf. ibid., 32, p. 498].

J. Völk and O. Bode (pp. 36–37), investigating the host range of potato leaf roll virus, performed successful transmission experiments with *Myzus persicae* to various hosts, including *Hyoscyamus niger*, *Nicandra physaloides*, *Nicotiana rustica*, *Solanum demissum*, and *S. acaule* [ibid., 30, p. 188].

Of 22 recently recognized potato varieties tested by C. Stapp (p. 46) for reaction to *Bacterium phytophthorum* [strain of *Erwinia carotovora*: ibid., 32, p. 448 and below, p. 642], three were resistant, six fairly resistant, another six susceptible, and three highly and four very highly susceptible. The rating of the old variety Wekaragis has undergone little change during the last eight years, while Voran [ibid., 29, p. 169] has maintained the high degree of resistance observed since 1939.

In tests by F. Burckhardt (pp. 83–84) on varietal reactions to potato scab [*Actinomyces scabies*: cf. ibid., 19, p. 564], Atlanta and Marktredwitzer were equally susceptible with Flava and Magna, used as standards of comparison, Niederarnbacher and Frühperle less susceptible, and Corona and Forelle fairly resistant.

L. Quantz's studies (pp. 39–40) on viroses of kidney bean [*Phaseolus vulgaris*] revealed seven natural hosts of bean yellow mosaic virus [ibid., 31, p. 587], including sweet pea, broad bean, pea, and yellow lupin, damage to the last-named being potentially serious. The virus was detected in the spring of 1951 on *Gladiolus* [ibid., 31, p. 435] for the first time in Germany.

Inoculation experiments by L. Quantz (p. 40) with a virus strain isolated in 1949 [ibid., 30, p. 300] revealed what appears to be a new mosaic virus of broad bean. About 16 other leguminous species, including pea, kidney bean, vetch, lentil, lupin, and crimson clover were infected. It is inactivated by a temperature exceeding 66° and withstands six days' ageing *in vitro*.

Of 477 species of *Streptomyces* isolated by C. Stapp (pp. 44–45) from soil samples on Conn agar the mycelia of 31 per cent. were grey, 19 per cent. yellow to orange, 18 per cent. brown, 17 per cent. hyaline, 8 per cent. red, 4 per cent. blue, and 1 per cent. black or greenish [cf. ibid., 32, p. 540].

The following observations were made by H. Pape (pp. 63–64) at the Institute for Cereal, Oil Seed, and Forage Plant Culture, Kiel-Kitzeberg, Schleswig-Holstein. Of 25 bean varieties only Schreibers Immuna and Zwaans Furore remained free from the very heavy anthracnose infection (*Gloeosporium* [*Colletotrichum*] *lindemuthianum*) [ibid., 31, p. 584, and below, p. 616] prevailing locally in 1951.

In small- and large-scale trials with copper-free fungicides against tulip 'fire' (*Botrytis tulipae*) [ibid., 31, p. 536] the best results were obtained with aafertis and liroferm [ibid., 31, p. 479], but the incidence of infection was also reduced and yields were increased by fuclasin, nirit, and pomasol with or without a wetter (tezet).

The report on spraying tests by H. Hochapfel (p. 76) at the Horticultural Institute, Heidelberg, for the control of apple mildew [*Podosphaera leucotricha*: see preceding abstract] has been given elsewhere [ibid., 32, p. 541]. As infection was considerably higher following earlier (19th April) pre-blossom treatment than later (26th April, when 65 per cent. of the Klar and 25 per cent. of the Allington Pippin flowers were already open) and on late varieties, such as Golden Pearmain which was still in the pink-bud stage, it is recommended that anti-mildew treatments should coincide as far as possible with flowering, when the surfaces of the young leaves are most readily accessible to the fungicides.

Orian (G.). **Plant Pathology Division.**—*Rep. Dep. Agric. Mauritius, 1951*, pp. 65–70, 1952.

In this report [cf. *R.A.M.*, 31, p. 537] it is stated that mild attacks of sugarcane red rot [*Physalospora tucumanensis*: ibid., 28, p. 325] and pineapple disease

[*Ceratostomella paradoxa*: ibid., 32, p. 591] were recorded in some newly planted fields, the latter disease also on rat-damaged standing cane on one estate in Savanne. Chlorotic streak virus was common under conditions of high soil moisture, but caused no visible cane damage. A few cases of smut [*Ustilago scitaminea*: C.M.I. map No. 79] occurred on imported Co. 421 and C.P. 34–120 growing in quarantine.

A disease of *Furcraea gigantea* var. *willemetiana*, characterized by large, yellow, water-soaked lesions at the butt end of the lower leaves, often associated with resinous exudate and sometimes accompanied by marginal scorching, was reported from the Richelieu Fibre Experiment Station in January. In the later stages the lesions enlarged and became visible on both sides of the leaf, turning dark brown to black, and often encircling the leaf, which gradually dried. A number of bacteria were isolated from the young lesions, but none reproduced the disease upon inoculation even under conditions of high humidity. Incidence seemed to be higher after a rainy spell, especially on plants that had been under water for some time. Potassium applications reduced the disease considerably, while nitrogen rendered the plants more susceptible, despite its beneficial effect on growth. Affected plants were also observed on the Savanne coast in a small area of sandy soil deficient in nutrients; on old charcoal-kiln sites, however, the plants were healthy.

Xanthomonas [*Pseudomonas*] *solanacearum* was responsible for wilting and death of filao (*Casuarina equisetifolia*) in the Flacq district. The disease may be present in the tree for several years before killing it, working its way up from the roots. Trees growing in badly drained soil are more susceptible. Control measures include the cutting down of all the trees in an infected area, together with the apparently healthy ones within a surrounding belt 30 to 50 ft. wide, replanting with eucalyptus rather than *Tecoma*, which may be susceptible to the same disease, and encouraging *Stenotaphrum dimidiatum* rather than wild solanaceous plants which might serve as sources of infection. Cultivation of filao might then be possible at a future date.

Dwarf bean [*Phaseolus vulgaris*] halo blight (*Pseudomonas medicaginis* var. *phaseolicola*) was severe at the Barkly and Royal Botanical Gardens Experiment Stations, resulting in the withdrawal of the seed from sale. A very severe attack of *P. solanacearum* wilt on tomato [*R.A.M.*, 8, p. 90] completely ruined the crop on a demonstration plot of the Food Production Board at Calebasse. *Sclerotium rolfsii* was reported on seed-bed onions [ibid., 14, p. 315]. *Cercosporella* [*Calonectria*] *theae* occurred on tea [cf. ibid., 32, p. 455] in fields and nurseries at Tamarind Falls following a period of wet weather. Groundnut stem rot (*S. rolfsii*) [ibid., 29, p. 351] developed in a varietal plot at the Pamplemousse Experiment Station, the varieties Bunch, Virginia Bunch, and Virginia being the most resistant.

Miller (P. R.). **Plant disease situation in the United States.**—*F.A.O. Plant Prot. Bull.*, 1, 2, pp. 17–18, 1952.

Early in the 1952 season in the United States tobacco was heavily attacked by blue mould (*Peronospora tabacina*) [*R.A.M.*, 32, pp. 119, 153, and next abstract], but later on incidence was light owing to the absence of prolonged optimum conditions for disease development and to the employment of good control programmes in many States. Fungicides recommended were 6·5 per cent. zineb dust or a 15 per cent. ferbam dust applied bi- or tri-weekly at 15 to 35 lb. per acre. It was estimated that in North and South Carolina 10,000 acres were soil-fumigated, or probably ten times as large an area as in 1951. Most of the treatment was with a DD mixture, but dow W-85 with plough-sole application was widely used in eastern North Carolina.

A darkening of oat caryopses by *Leptosphaeria avenaria* [ibid., 32, p. 248] rendered much of the commercial oat supply from several of the most productive States unfit for milling.

The recording of wheat take-all (*Ophiobolus graminis*) in Georgia in the spring of

1952 represented a considerable southward spread; records even as far south as North Carolina are uncommon.

Miller (P. R.) & O'Brien (Muriel). **The plant disease warning service in 1952.**—*Plant Dis. Reptr, Suppl.* 217, pp. 203–212, 1952. [Multilithed.]

In this review of the disease situation in Canada and the United States during 1952 [cf. *R.A.M.*, 31, p. 226] reports based on brief summaries and items from warning letters are listed alphabetically by Province or State. The season was characterized by the absence or moderate occurrence only of *Phytophthora infestans* on potato [ibid., 32, p. 208] and tomato [ibid., 32, p. 154], tobacco blue mould (*Peronospora tabacina*) [see preceding abstract], and cucurbit downy mildew (*Pseudoperonospora cubensis*) [ibid., 31, p. 226], which were less widespread and caused less damage than in any year since 1946.

Stout (G. L.). **Bureau of Plant Pathology.**—*Rep. Dep. Agric. Calif., 1951* (*Bull. Dep. Agric. Calif.*, 40, 4), pp. 207–227, 2 figs., 1951. [Received 1952.]

In this report [cf. *R.A.M.*, 31, p. 227] cotton angular leaf spot [blackarm] (*Xanthomonas malvacearum*) [C.M.I. map No. 57] is recorded from a field in Fresno county which had received overhead irrigation. The disease is rare in California and this appears to be its first record in the locality concerned.

G. E. Alstatt and B. W. Lee, reporting on the permanent survey for plant diseases, state that no virus disease was detected on 146,000 *Hibiscus* plants in southern commercial fields. *Sclerotium rolfsii* caused damage to *Dichondra* lawns in the south. Chestnut blight [*Endothia parasitica*: *R.A.M.*, 32, p. 459] was found on four trees in San Joaquin county, on two previously affected properties. Six more peach trees with symptoms of yellow bud-mosaic virus [ibid., 32, p. 260] were destroyed on a property in San Bernardino county.

C. G. Weigle and A. M. French record that in an inspection of 477,213 peach trees 2,470 new cases of mosaic virus [ibid., 31, p. 228] were discovered, but none was present outside the quarantined area. There were 236 newly infected properties. A. Schlocker reports that in an inspection of peach orchards in 14 counties [ibid., 30, p. 572; 31, p. 614] yellow leaf roll virus was found only in the 'peach bowl' area of Butte, Placer, Sutter, and Yuba counties. New cases totalled 1,029 on 69 properties, 44 of which had shown no sign of the disease in 1950. No peach wart virus disease [ibid., 28, pp. 408, 442] was found, all known cases in California having been eradicated. In 1951 new cases of peach western X-disease [? strain of peach X-virus: ibid., 31, pp. 22, 421] totalled 1,352 on 276 properties.

H. K. Wagnon states that the most serious disease confronting propagators of almond trees in parts of California is 'bud failure' or 'crazy top' [ibid., 24, p. 324], which is bud- and scion-perpetuated. The variety Jordanolo is so seriously affected that some nurserymen find it unprofitable to propagate. The disease commonly occurs also on Peerless and Nonpareil.

R. L. McClain states that citrus quick decline virus [ibid., 32, p. 251 and below, pp. 621, 622] made comparatively little progress in the lightly infected areas in Los Angeles, Orange, Riverside, and San Bernardino counties and in the provisional zones of Ventura county. In the heavily infected zone rapid spread occurred in parts of the eastern Los Angeles, western San Bernardino, and northern Orange counties. The disease was not found outside the quarantined area.

In the section of this report (pp. 259–279) dealing with the work of the Bureau of Chemistry by A. B. Lemmon data on the use of aircraft in crop pest and disease control [cf. ibid., 32, p. 203] are tabulated. Of a total of 2,892,559 acres receiving applications by this method in 1951, 217,205 were treated against diseases. The use of mixed materials intended for several control purposes is widespread.

Castellani (E.). **Problemi fitopatologici degli stati centro-meridionali del Brasile.** [Phytopathological problems in the central-southern states of Brazil.]—Reprinted from 'Emigrazione e colonizzazione agricola in Brasile'. [Emigration and agricultural colonization in Brazil], pp. 413–484, 5 pl., 1952.

This survey of the disease situation in Brazil was compiled as the result of a personal tour [? in 1951] of the Federal District and the States of Bahia, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, and Rio Grande do Sul. Notable records include lucerne dwarf virus on vine in São Paulo [C.M.I. map No. 262], *Venturia inaequalis* on apple [ibid., No. 120], *Clasterosporium carpophilum* [hosts unspecified: ibid., No. 188], and *Cercospora arachidicola* on groundnut [ibid., No. 166].

Informe del Instituto Agropecuario Nacional, Guatemala, por el periodo de julio 1° de 1951 a junio 30 de 1952. [Report of the National Institute for Agriculture and Livestock, Guatemala, for the period 1st July, 1951, to 30th June, 1952.] —97 pp., 1 map, 1952. [Mimeographed. Received August, 1953. English translation.]

On p. 73 of this report [cf. *R.A.M.*, 31, p. 54] it is stated that there was a fairly severe attack on coffee by *Pellicularia* [*Corticium*] *koleroga* [C.M.I. map No. 64] which affected chiefly the varieties Kona, Murta, and Laurina (Leroy). San Ramón, Bourbon, Maragogipe, *Coffea stenophylla*, *C. liberica*, and *C. robusta* showed medium to good resistance. A hedge planting of *C. arabica* Bourbon (p. 75) was attacked by die-back tentatively ascribed to *Corticium salmonicolor* [ibid., No. 122]. Bordeaux mixture at 5–5–50 appeared to give control.

The Pathology Department (pp. 82–83) reports that native bean [*Phaseolus vulgaris*] varieties, especially those from Chimaltenango, are mostly highly resistant to anthracnose (*Colletotrichum lindemuthianum*) [ibid., No. 177; cf. above, p. 613] which is severe in the western bean-growing areas. Other diseases commonly observed were rust [*Uromyces appendiculatus*: *R.A.M.*, 25, p. 71] and the leaf spots caused by *Isariopsis griseola* [ibid., 11, p. 431] and *Chaetoseptoria wellmani* [ibid., 31, p. 47]. Some rust-resistant lines have yielded selections for further study.

Preliminary studies in 1951 and 1952 revealed that potato blight (*Phytophthora infestans*) [C.M.I. map No. 109] was extremely severe at 6,000 ft., killing highly susceptible varieties 6 to 8 weeks after planting. However, certain semi-resistant varieties even at this height yielded reasonably well, i.e., up to 7,500 lb. without spraying. Up to 12,000 lb. per acre were obtained at higher altitudes. Further studies indicated that potato production during the rainy season is quite feasible provided that sprays are applied.

Sutton (M. D.) & Katznelson (H.). **Isolation of bacteriophages for the detection and identification of some seed-borne pathogenic bacteria.**—*Canad. J. Bot.*, 31, 2, pp. 201–205, 1 pl., 1953.

Strain-specific and polyvirulent phages for *Pseudomonas pisi* were isolated from peas at the Division of Bacteriology and Dairy Research, Department of Agriculture, Ottawa, by the following method. Pea samples (100 seeds) were ground in 500 ml. nutrient broth in a Waring Blendor for seven minutes, after which one half was heavily inoculated with strain P 11 of *P. pisi* and the other with P 26. Following incubation overnight at room temperature, suitable aliquots of the mixtures or of sterile Seitz filtrates thereof were plated with a heavy suspension of these strains from 24-hour yeast beef agar cultures. Plaques were transferred to seeded broth and serial passages made daily to increase phage titre. For cereals, ground dry grain was divided into portions of 125 to 150 gm., each of which received 150 ml. nutrient broth inoculated with a broth suspension of a certain organism from two 18-hour yeast beef agar cultures and was incubated overnight at room temperature with

frequent stirring. Filtrates of these mixtures were passed through sterile Seitz filters and then added in 1-ml. amounts to 10 ml. broth seeded with the test organism. After clearing had taken place (5 to 10 hours) the cultures were filtered and serial passages made daily until the desired titre was obtained.

The polyvirulent phage for *P. pisi* also lysed strains of *P. glycinea*, *P. lachrymans*, and *P.* [*medicaginis* f. sp.] *phaseolicola* [*R.A.M.*, 30, p. 363]; it has been used successfully for detecting the presence of *P. pisi* in pea seed (by means of the rapid phage plaque count technique) [loc. cit.] and in plant tissue from infected fields. Specific phages for *P. atrofaciens* and *P. coronafaciens* were obtained from wheat and oat seeds, respectively; the former phage was widely distributed. Phages specific for *Xanthomonas translucens* f.spp. *hordei*, *secalis*, and *hordei-avenae* [ibid., 32, p. 239] were isolated from barley and oat seed. Attempts to isolate phages for *X.t.* f. spp. *cerealis* and *undulosa* were unsuccessful.

LOCKHART (W. R.). **A single tube method for anaerobic incubation of bacterial cultures.**—*Science*, 118, 3057, p. 144, 1 fig., 1953.

To obtain anaerobiosis in culture tubes the author uses a tube stoppered with a cotton plug rolled tightly round a small vial. When anaerobic conditions are required the plug is pushed down until the tip of the vial is below the lip of the tube; 2 ml. each of 40 per cent. potassium hydroxide and 20 per cent. pyrogallol are pipetted into the vial, the mouth of the tube is lightly flamed at once, and a paraffin-coated rubber stopper inserted, being held firmly in place until the paraffin has hardened into a seal. Anaerobiosis is complete and moderately rapid and may be expedited by inserting a strip of filter paper folding accordion-wise in the vial to provide greater surface for oxygen adsorption.

WATERHOUSE (W. L.). **Australian rust studies. IX. Physiologic race determinations and surveys of cereal rusts.**—*Proc. Linn. Soc. N.S.W.*, 77, 3–4, pp. 209–258, 1 pl., 1952.

In further studies in this series [cf. *R.A.M.*, 31, p. 330] the author brings up to date the information on cereal rusts in Australia and New Zealand, giving details of the distribution of physiologic races [cf. ibid., 32, p. 425]. The need for the clarification of a number of outstanding problems related to life histories, the survey of the rust flora, the origin and production of mutations, and the nature of resistance is emphasized.

Yellow rust of Wheat in England and Wales, 1952.—*Plant Path.*, 2, 1, pp. 37–38, 1953.

During 1952 wheat yellow rust (*Puccinia glumarum*) was exceptionally prevalent in most parts of England and Wales [*R.A.M.*, 31, p. 598 and next abstract], susceptible varieties suffering severely. In the north-west it was first observed on the Welcome variety in April. By late July infection was widespread; on Pilot attack was frequently severe and in many crops of Jubilegem the glumes were infected. Little rust was found in the north-west or in northern Wales. In the Midlands the disease was already severe in some crops, chiefly Jubilegem, while in western areas it was severe by May. In the eastern part the disease was first recorded at Cambridge in March; by mid-April it was severe on several crops of Jubilegem and Nord Desprez, becoming particularly virulent on the latter, the glumes of which were conspicuously infected; later the disease was widespread throughout the eastern counties. In the south-west the rust did not become prevalent until the end of July, when Nord Desprez frequently developed severe infection.

In the past three seasons race 8 [ibid., 32, p. 173] was found in all parts of the country, especially on Wilma, Jubilegem, and Pilot. Race 5 [loc. cit.] occurred in

the north, where it attacked King II severely. Race 2 [loc. cit.] was present in central and southern England, Nord Desprez being particularly susceptible to it.

Batts (C. C. V.) & Elliott (C. S.). **Indications of effect of yellow rust on yield of Wheat.**—*Plant Path.*, 1, 4, pp. 130–131, 1 graph, 1952.

A graphical representation of the yield of a wheat variety (Wilma) susceptible to yellow rust (*Puccinia glumarum*) as a percentage of the yield of the resistant Juliana in trials at 13 centres in England [see preceding abstract] from 1945 to 1947 showed that early infection may considerably reduce the yield of Wilma, though if the attack occurs later little reduction is to be expected. Thus, in five of the trials where rust was slight or nil, the yields of the two varieties did not differ significantly, whereas the yield of Wilma was on the average 78 per cent. lower than that of Juliana in four trials in which it was attacked before mid-June.

Glynne (Mary D.). **Production of spores by Cercosporella herpotrichoides.**—*Trans. Brit. mycol. Soc.*, 36, 1, pp. 46–51, 1 pl., 1953.

Field studies at Rothamsted Experimental Station, Harpenden, Herts., revealed that eyespot lesions on young wheat plants regularly produced conidia of *Cercosporella herpotrichoides* [*R.A.M.*, 32, p. 370] in early spring. They were not produced on mature growing plants, but after ploughing lesions on infected straws sporulated freely, especially in wet weather.

In the laboratory lesions produced spores when straws were soaked in water for 24 hours, drained, and kept continuously wet. Disks from potato dextrose or water agar cultures sporulated abundantly when in contact with water at favourable temperatures; excess water reduced sporing. Spores developed most abundantly when the temperatures fluctuated between 3° and 13° C., were produced freely between 12° and 22°, more slowly at 1° to 2° and not at all at 24° to 25°. Daylight did not appear to influence sporulation.

Vasudeva (R. S.) & Hingorani (M. K.). **Tannan or tundu disease of Wheat.**—*Indian Fmg*, N.S., 2, 3, pp. 14, 19, 2 figs., 1952.

A description is given of the symptoms and control of tannan or tundu disease of wheat (*Corynebacterium tritici*) [*R.A.M.*, 32, p. 123] and of its nematode vector, *Anguillulina tritici* [loc. cit.]. The disease is very severe in many parts of India, particularly in Delhi State, where it causes an average damage of 1 to 2 per cent.

Yukawa (Y.) & Huzii (S.). **The effects of urea on the growth of Gibberella saubinetii Sacc. and Piricularia oryzae Br. et Cav.**—*Bull. Fac. Agric. Yamaguti Univ.* 3, pp. 7–14, 1952. [Received May, 1953.]

A solution of 0·5 per cent. urea sprayed on wheat plants as a fertilizer was found to be effective in controlling the germination of conidia of *Gibberella saubinetii* [*G. zeae*: *R.A.M.*, 32, p. 35] and also of *Piricularia oryzae* [loc. cit.]. The mycelial growth of the latter on a medium containing 0·5 per cent. urea was less than on the control, but greater with 0·1 to 0·01 per cent. urea. Concentrations of 2,4-D [cf. ibid., 30, p. 239] of 0·1 per cent. and over inhibited germination of *G. zeae*, but 0·05 per cent. used for field spraying had no effect and was slightly stimulatory to the germination of *P. oryzae* conidia [loc. cit.]. Field tests are to be carried out.

Moseman (J. G.), Gore (U. R.), & McKinney (H. H.). **Reaction of winter Oat varieties and selections to soil-borne viruses in southeastern United States.**—*Plant Dis. Reptr*, 37, 4, pp. 226–229, 1953. [Multilithed.]

The following oat varieties showing some resistance to the apical and eyespot mosaic viruses [cf. *R.A.M.*, 29, p. 93] were recommended for growing in infested

soil in Virginia, North and South Carolina, Georgia, Tennessee, and Alabama, in 1952: Forkedeer, DeSoto, Lemont, Carolina Red, Atlantic, Arlington, LeConte, Victorgrain 48–93, Fulgrain '52BFC, Anderson, and Terruf. The reactions of 63 strains and varieties tested in nurseries from 1949 to 1952, inclusive, and of 58 tested in 1951 and 1952 are given. None was immune.

Williams (C. H.) & Moore (C. W. E.). **The effect of stage of growth on the copper, zinc, manganese, and molybdenum contents of Algerian Oats grown on thirteen soils.**—*Aust. J. agric. Res.*, 3, 4, pp. 343–361, 7 graphs, 1952.

In pot studies in the glasshouse at the Division of Plant Industry, Canberra, Australia, the characteristic changes in trace element content of Algerian oats with growth were generally similar, irrespective of the soil. Except for manganese, availability of the element did not affect the trend of the changes, but only the amount present. Uptake continued throughout growth. The total amounts of copper and zinc in both leaf and stem decreased after flowering. The amount of manganese in the leaf increased throughout growth, though rate of increase declined after flowering. The amount of molybdenum in the leaf increased until flowering, after which there was little change. The rate of uptake of manganese approximately equalled the rate of production of dry matter, whereas that of the other elements was relatively greater in the early stages. Manganese availability decreased with increasing soil pH [*R.A.M.*, 31, p. 631] while molybdenum availability was affected by the combined influences of soil pH and soil iron.

Melhus (I. E.) & Smith (F. O.). **Helminthosporium leaf blight of Corn in Guatemala.**—*Turrialba*, 3, 1–2, pp. 14–22, 2 figs., 1953. [Spanish summary.]

Helminthosporium turcicum leaf blight is severe on maize in the Guatemalan highlands [*R.A.M.*, 30, p. 607], causing losses ranging from 5 to 50 per cent. In general the Early, Coastal, and Mountain groups of varieties are more susceptible than the Giganteum group. An induced epiphytotic provided the means for testing breeding lines and hybrids [see next abstract]. United States inbreds and single crosses and top crosses of Guatemalan varieties on United States inbreds were more susceptible than most Guatemalan varieties. Thirty-four inbred lines of 47A–46 [ibid., 29, p. 505] grown in 1949 showed a trace to class 1 (1 to 5 per cent. leaf area destroyed) infection, suggesting that it carries numerous blocks of genes for resistance. In 1952, following inbreeding for four generations, it developed the same amount of infection. It was highly resistant in the United States maize belt while top crosses on highly susceptible United States inbreds were resistant. Resistant varieties of the Giganteum group were 134A–46, 31–44, 159–44, 1483–45, 92A–46, and 20–47. In single crosses of Guatemalan varieties involving a resistant female and susceptible male, resistance of the F_1 was generally intermediate. In 1952, 29 three-way hybrids were secured from Guatemalan inbreds of the Coast and Giganteum groups cycled on the United States single cross 187–2 × L317. The average injury class for those of Giganteum origin was 1·8 and for those of Coast origin 2·78.

Wernham (C. C.). **The mass production of blight-resistant Corn.**—*Plant Dis. Reptr*, 37, 3, pp. 138–141, 1953. [Multilithed.]

In studies at the Department of Plant Pathology, Pennsylvania State College, on the development of leaf blight (*Helminthosporium turcicum*) resistance in maize [*R.A.M.*, 32, p. 182], inbred lines with intermediate resistance or complete susceptibility were found to be of profitable use in the breeding programme when crossed with some lines of a higher degree of resistance. More hybrids of desirable resistance were produced when resistant × susceptible crosses were back-crossed or crossed with another resistant line than when they were selfed.

Nattrass (R. M.). **Preliminary notice of the occurrence in Kenya of a rust (Puccinia polysora) on Maize.**—*E. Afr. agric. J.*, 18, 1, p. 39, 1952.

This notification of maize rust (*Puccinia polysora*) in Kenya has already been noticed from another source [*R.A.M.*, 32, p. 309]. Agricultural Officers and others are invited to report suspected outbreaks.

Siang (W. N.). **Notes on some diseases of Proso-Millet in North China.**—*Acta Agric., Peiping*, 2, 1, pp. 69–74, 1 pl., 1 graph, 1948. [Chinese summary. Received December, 1952.]

Helminthosporium leaf spot is common on proso-millet (*Panicum miliaceum*) in North China but causes little damage because of its late occurrence. The author considers that the two species recorded as being responsible for the disease, *H. panici-miliacei* and *H. yamadai* [*R.A.M.*, 13, p. 804], are indistinguishable morphologically and should be treated as one.

Sphacelotheca destruens [C.M.I. map No. 219; *R.A.M.*, 26, p. 421] is often severe in some localities. *Sorosporium syntherismae*, previously reported only from Japan on *P. miliaceum*, was found in 1947 near Peiping. It is highly probable that the two smuts hybridize under natural conditions [ibid., 22, p. 476].

Kovachich (W. G.). **Little leaf disease of the Oil Palm (Elaeis guineensis) in the Belgian Congo. Part 2.**—*Trop. Agriculture, Trin.*, 30, 1–3, pp. 61–69, 2 pl., 1 graph, 1953.

Further studies on the little leaf disease of the oil palm in the Belgian Congo [*R.A.M.*, 32, p. 373] indicate that the disease is influenced by certain cultural treatments. Fertilizing young palms and felling old ones both increased disease incidence and the growth rate in young palms. Fertilized palms grown under shade had a lower growth rate and a higher disease incidence than those grown without fertilizers and without shade. It is believed that fertilizers cause a deficiency or upset the balance of nutrients, both of which are probably responsible for the disease.

The data obtained suggest that most of the palms became infected during the period between September, 1950, and July, 1951, the disease being most severe during March, April, and May, immediately before the dry season.

Calavan (E. C.), Klotz (L. J.), DeWolfe (T. A.), & Sufficool (J. R.). **New sprays for control of brown rot of Citrus.**—*Calif. Citrogr.*, 38, 2, p. 77, 1952.

Of the non-copper fungicides tested at the University of California Citrus Experiment Station for control of citrus brown rot [*Phytophthora* spp.: *R.A.M.*, 30, p. 464, and next abstract] without injury, orthocide 406 (2 lb. per 100 gals. water plus 4 oz. caseinate spreader) and ferric-zinc-dithane plus 2 oz. spreader-sticker appeared the most promising. While the standard recommendation is still zinc sulphate–copper sulphate–hydrated lime [loc. cit.], other copper-containing materials which have controlled brown rot in experimental plots in Ventura county during the past two seasons are 20–4 zinc-copper fungorex (8 lb. per 100 gals. plus oil and a spreader-sticker), copper A compound ($1\frac{1}{2}$–100 plus 3 lb. hydrated lime to reduce copper injury), single package Bordeaux (giving $\frac{1}{4}$ to $\frac{1}{2}$ lb. elemental copper per 100 gals.), crag 658 (2–100), and C.O.C.S. ($1\frac{1}{2}$–100).

Bitters (W. P.) & Batchelor (L. D.). **Gummosis resistance of Troyer Citrange.**—*Calif. Citrogr.*, 38, 6, pp. 192, 200, 1953.

The first few trees budded experimentally on Troyer citrange, resistant to gummosis [*Phytophthora* spp.: *R.A.M.*, 32, p. 310 and preceding abstract], were planted

in California in 1944, subsequent plantings being made each year. They made excellent growth in orchards, particularly as replants in old groves, while adjacent trees on sweet orange, grapefruit, and rough lemon roots occasionally showed evidence of gummosis. In a small commercial planting 100 per cent. of the trees on sweet orange were killed by the disease during the winter of 1950–51, whereas an equal number on Troyer were uninjured.

In May, 1951, an experimental planting was made on old citrus land at the Citrus Experiment Station using 11 different kinds of Valencia scion on sweet orange and Troyer citrange rootstocks; there were 210 trees on each stock for direct comparison. An attack of gummosis was under way in spring, 1952, induced by the use of tree wraps and furrow irrigation. The disease attacked 87 per cent. of the trees on sweet orange, 56 trees being 50 per cent. or more girdled. Less than 1 per cent. of the trees on Troyer citrange was affected.

The resistance of Troyer citrange to gummosis now appears to be well established, though its increased use as a stock will depend on its continued resistance to quick decline [but see ibid., 31, p. 62, and next abstract] and its adaptability to California calcareous soils.

Bitters (W. P.), Dukeshire (N. W.), & Brusca (J. A.). **Stem pitting and quick decline symptoms as related to rootstock combinations.**—*Calif. Citrogr.*, 38, 5, pp. 154, 170–171, 4 figs., 1953.

The presence of stem pitting in the Valencia-Morton citrange stock-scion combination in California [*R.A.M.*, 32, p. 428] suggested the advisability of examining the more extensive plantings at Baldwin Park, comprising Valencia tops on 125 different rootstocks. Alternate trees were bud-grafted from quick decline trees [see preceding and next abstracts] in September, 1948, and examined in October, 1952, by temporarily removing a strip of bark from the bud union. Of 2,042 trees examined 326 showed pitting; 34 on the Valencia trunk, 8 on both root and trunk, and 300 on the rootstock alone. Of the 326 affected trees 180 had been inoculated and 146 were uninoculated controls which had been naturally infected by insects. There appeared to be no relationship between stem pitting and the presence of top symptoms of quick decline.

The reactions of the 125 stocks are grouped as follows: 14 per cent. of the trees on lime stocks showed pitting, the severest occurring on Palestine Sweet lime, West Indian lime, and Kusaie; Lemelo, Khoubs-el-arsa, Rabat, Dorshapo sweet lemon, and Eureka lemon were fairly susceptible; rough lemon and Bigaraldin were slightly pitted, while Lisbons were unaffected. Of the trees on 19 sour orange rootstocks 13 per cent. displayed pitting; of the 16 varieties of sweet orange stocks only 6 per cent. were pitted, Dolandan appearing the most susceptible. Contrary to the results obtained by Grant *et al.* in Brazil [ibid., 31, p. 62] grapefruits were least affected, while 80 per cent. of the trees on trifoliate orange [*Poncirus trifoliata*] stocks were pitted. Of nine varieties of shaddock stocks only one is unaffected so far. The shaddock-sweet orange hybrids were pitted more severely than either parent. Of the trifoliate hybrids Etonia, Carizzo, and Morton citranges, a citremon, a citrangequat, and a citrumelo were badly affected, but only one tree out of 18 on Troyer citrange [see preceding abstract] showed slight pitting. Pits on trifoliate hybrids generally appeared as long, narrow striations. The Morton citrange stocks bearing seven-year-old Valencia trees were severely distorted. As a group, mandarins were only slightly affected, Kinokuni being pitted most severely, whereas the mandarin hybrids and *ichangensis* hybrids were fairly sensitive, particularly Kinnou and Kara mandarins, Minneola tangelo, and Yuzu orange. In the miscellaneous group *Citrus moi*, *C. macroptera*, and the diamante citron were all severely pitted. In all the combinations examined pitting seemed most severe in the area of the bud union.

Bitters (W. P.) & Parker (E. R.). **Quick decline of Citrus as influenced by top-root relationships.**—*Bull. Calif. agric. Exp. Sta.* 733, 34 pp., 1 col. pl., 5 figs., ? 1953. [Received August, 1953.]

This bulletin is a progress report of work being carried on at the University of California Citrus Experiment Station, Riverside, to determine the tolerance or susceptibility to quick decline [*R.A.M.*, 32, p. 480 and preceding abstracts] of the commercially important varieties of citrus when grown on a large number of species and varieties of rootstocks. The possibility of altering existing top-root relationships of susceptible orchard trees, by means of topworking, inarching, and bridgegrafting, is also considered.

Klotz (L. J.) & DeWolfe (T. A.). **Steam sterilization of Citrus boxes.**—*Calif. Citrogr.*, 38, 2, p. 68, 1952.

Experiments in the Department of Plant Pathology, University of California Citrus Experiment Station, demonstrated that a 30-second exposure of 1-in. square inoculated pieces of wood from citrus field- and packing-boxes to steam at 194° to 210° F. was fatal to *Trichoderma lignorum* [*T. viride*: *R.A.M.*, 29, p. 40], *Sclerotinia sclerotiorum*, *Penicillium* spp., and *Alternaria citri*. Exposures for 10 and 20 seconds killed only *S. sclerotiorum* and *A. citri*. It is suggested that the passage of boxes through a steam tunnel during packing house operations would eliminate an important source of contamination and decay of fruit during and after processing. *T. viride* causes major losses in stored lemons.

Stepanov (K. M.) & Shumakov (A. A.). О периодах заражении Лимона инфекционным усыханием ('мальсекко'). [Concerning the times of Lemon infection with infectious wilting ('mal secco').]—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad. agric. Sci.*], 18, 11, pp. 34–38, 4 graphs, 1952.

Studies at the Pan-Soviet Scientific Research Institute of Plant Protection showed that in the subtropical regions of the U.S.S.R. infection of lemon by *Deuterophoma tracheiphila* [*R.A.M.*, 31, p. 604] occurs throughout the autumn and during most of the winter and spring. Although temperature and humidity conditions in the summer are favourable for disease development resistance of the trees is increased and primary infections depending on pycnidial formation are limited [ibid., 30, p. 414].

Sanitary control measures [loc. cit.] should be completed in the summer before mass infection occurs and applied again during the second infection period from February to May, when particular care is required. Bordeaux sprays applied in the summer are effective in preventing or checking the disease.

Wallace (J. M.) & Drake (R. J.). **New virus found in Citrus.**—*Calif. Citrogr.*, 38, 5, pp. 180–181, 1 fig., 1953.

A new virus disease, inducing vein swelling and enations on the lower leaf surface, has been observed on citrus in California. In cases where the projections are sufficiently large there is a corresponding depression on the upper surface. These abnormalities were first observed on leaves of sour orange sprouts produced from quick decline trees that had been removed. Graft transmission studies demonstrated that the virus could be transferred from sour orange to sour, bittersweet, and sweet orange, grapefruit, tangerine, lime, rough lemon, and lemon. The symptoms were most pronounced on sour orange and Mexican lime; sometimes they did not appear on lemon seedlings though the virus could be recovered from them. The new virus is distinct from quick decline and is transmitted by at least one species

of aphis (not *A. gossypii*). It has been recovered from a high percentage of trees in certain plantings.

Hughes (L. C.) & Fowler (H. D.). **Resistance to a plant disease associated with high glucose content of leaf.**—*Nature, Lond.*, 172, 4372, p. 316, 1953.

Co-operative experiments by the Empire Cotton Growing Corporation and the Ministry of Agriculture, Wad Medani, Anglo-Egyptian Sudan, demonstrated that leaf extracts of synthesized cotton varieties containing the genes B_2 and B_2+B_3, which confer resistance to blackarm (*Xanthomonas malvacearum*) [*R.A.M.*, 32, p. 431], had a stronger reducing action on Fehling's solution owing to a significantly higher glucose level in the leaf which is present from the cotyledonary stage onwards, in plants from different plots, sampled at different times of the day. The resistant seed contained higher sucrose and raffinose and the leaves were generally higher in phosphate also.

While no inhibition of the local strains of *X. malvacearum* on nutrient agar has been observed with additions of glucose up to 10 per cent. w/v, in one instance glucose plus phosphate inhibited growth but only after sterilization at high temperatures [ibid., 9, p. 715]. It seems certain that resistance resides not in the glucose itself but in some factor giving rise early to a high glucose content.

Leyendecker (P. J.), Blank (L. M.), & Nakayama (R. M.). **Further observations on black root rot of Cotton in the upper Rio Grande Valley of Texas and New Mexico.**—*Plant Dis. Reptr*, 37, 3, pp. 130–133, 2 figs., 1 map, 1953. [Multilithed.]

Cotton root rot (*Thielaviopsis basicola*) was observed in 10 additional fields in Texas in 1952 [*R.A.M.*, 31, p. 383] extending for some 75 miles in the upper Rio Grande Valley of Texas and New Mexico. The varieties attacked were Pima 32, an American-Egyptian variety of *Gossypium barbadense*, and an Upland plant (*G. hirsutum*).

Miller (P. R.). **Plant disease loss estimates : false vs. true.**—*Plant Dis. Reptr*, 37, 4, pp. 171–174, 1953. [Multilithed.]

The author criticises the erroneous and inadequate estimates of cotton losses due to diseases in the United States for the period from 1909 to 1939 published by the Bureau of Agricultural Economics in 'Statistics on Cotton and related data' (*Statist. Bull.* 99, 1951). In comparison with the figures issued in the Plant Disease Survey's Crop Loss Estimates for the period from 1917 to 1939, the former estimates are too small, geographical and seasonal differences are not considered, and a wrong impression is given of the importance of disease in cotton production. Attention is drawn to the danger of publishing such unreliable information in view of its possible consequences to research and it is urged that assessment of disease losses [cf. *R.A.M.*, 32, p. 580 and next abstract] should be considered by pathologists as a necessary part of their investigations. The manner of obtaining the estimates and their purpose should be stated and the figures should be reliable and up-to-date.

A committee has been set up for assembling statistics on cotton disease losses [see next abstract].

Leyendecker (P. J.), Smith (A. L.), Lett (L.), & Lehman (S. G.). **Reduction in yield of Cotton caused by diseases in 1952.**—*Plant Dis. Reptr*, 37, 4, pp. 175–177, 1953. [Multilithed.]

A tabulated summary of the reductions in cotton yield due to pests and diseases in 1952 in 13 States of the United States was compiled by the Cotton Disease Council's Committee on Disease Losses [cf. preceding abstract] from estimates received from 48 specialists in the cotton belt. Anthracnose (*Glomerella gossypii*)

[*R.A.M.*, 30, p. 104] caused a total loss of 63,171 bales, bacterial blight (*Xanthomonas malvacearum*) [ibid., 31, p. 282] 275,760, *Ascochyta* blight (*A. gossypii*) [loc. cit.] 21,520, *Fusarium* wilt (*F. vasinfectum*) [ibid., 29, p. 561; 32, p. 252] 163,518, *Verticillium* wilt (*V. albo-atrum*) [ibid., 30, p. 367] 61,277, root rot (*Phymatotrichum omnivorum*) [ibid., 28, p. 287] 137,865, seedling diseases (*Rhizoctonia* sp., etc.) [see next abstract] 500,457, boll rots (*Rhizopus* sp., etc.) 199,620, potassium [ibid., 23, p. 225], magnesium [ibid., 20, p. 300], and other deficiencies 218,400, and [unspecified] diseases 135,464, in an aggregate of 1,966,303 bales lost, the total yield being 15,038,000.

Schwegmann (J. C.). **Temperature-pathogenicity relationships in Rhizoctonia solani on Cotton.**—*Plant Dis. Reptr*, 37, 4, p. 178, 1953. [Multilithed.]

At the Department of Botany, Bacteriology, and Plant Pathology, Louisiana State University, six isolates of *Rhizoctonia* [*Corticium*] *solani* from cotton [*R.A.M.*, 28, p. 65] were screened for tolerance of high temperatures. Oat cultures were added to sterile soil in pots which were planted with acid-delinted cotton seed treated with ceresan M and kept in a humidity chamber at temperatures reaching 30° C. during the day and controlled to a minimum of 25° at night. Significant differences were observed between the isolates; all attacked the seedlings, three causing severe damping-off.

De Coene (R.). **Les méthodes et les progrès de la sélection du Cotonnier à Bambesa.** [Methods and progress of Cotton selection at Bambesa.]—*Bull. Inform. Inst. Étud. agron. Congo belge*, 1, 4, pp. 289–304, 1952.

Selection of cotton lines at Bambesa, Belgian Congo, has yielded some highly resistant to wilt (*Fusarium vasinfectum*) [*R.A.M.*, 27, p. 122; 32, p. 186] but devoid of commercial value. As back-crossing has not given encouraging results, efforts are now being made to eliminate susceptible lines from economic selections by means of a wilt test.

Subramanian (C. V.). **Studies on south Indian Fusaria. I. Fusarium vasinfectum Atk., with a note on its varieties and forms. II. Fusaria isolated from black Cotton soils.**—*Proc. nat. Inst. Sci. India*, 18, 4, pp. 273–285, 1 fig.; 6, pp. 557–584, 14 figs., 1952.

An account is given of further systematic studies on Indian species of *Fusarium* [cf. *R.A.M.*, 31, p. 258; 32, p. 451]. Isolates from wilted cotton plants and 'wilt-sick' cotton soil from southern India all belonged to the *Elegans* [loc. cit.] group and are similar morphologically, but vary in regard to growth rate in culture and pathogenicity to cotton. Detailed comparisons of these isolates with *F. vasinfectum* [ibid., 28, p. 412; 31, p. 594] and its varieties and forms, obtained from the Centraalbureau voor Schimmelcultures, Baarn, Holland, indicate that all varieties and forms recognized by Wollenweber and Reinking [ibid., 14, p. 708], except *F. vasinfectum* var. *zonatum* f. 1, are synonyms of *F. vasinfectum*. The Indian isolates are identified as *F. vasinfectum*.

Isolates from the black cotton soils of Udamalpet, Coimbatore District, Madras State, identified as *Fusarium poae*, *F. chlamydosporum*, *F. avenaceum*, *F. equiseti*, *F. scirpi* and its vars. *acuminatum* and *caudatum*, *F. culmorum*, *F. oxysporum*, *F. javanicum* and its var. *radicicola*, *F. solani* and its vars. *martii*, *minus*, and *striatum* are described, together with their type of growth on media, and measurements of conidia and chlamydospores [cf. ibid., 31, p. 597].

Bose (S. K.) & Mehta (P. R.). **A new species of Entomophthora on Beetles.**—*Trans. Brit. mycol. Soc.*, 36, 1, pp. 52–56, 11 figs., 1953.

During July, 1950, severe mortality of chestnut-defoliating beetles (*Brahmina*

sp.) occurred at the Government Gardens, Chaubattia, India. The causal organism is designated *Entomophthora brahminae* n. sp. An apple-defoliating beetle (*Anomela rufiventris*) was also found infected.

Atkins (R. E.) & Reddy (C. S.). **Response of Flax varieties to seed treatment.**—*Plant Dis. Reptr*, 37, 4, pp. 230–231, 1953. [Multilithed.]

Experiments were carried out from 1950 to 1952, inclusive, in five localities in Iowa to determine the response of ten flax varieties to seed treatment [*R.A.M.*, 28, pp. 172, 524; 32, p. 578] with ceresan M (1 oz. per bush.) and panogen (1·4 per cent. mercury at $1\frac{1}{2}$ oz. per bush. in 1950 and 1951 and 1·5 per cent. mercury at 2 oz. per bush. in 1952). Both treatments resulted in sufficient increase in seed yield (in all the varieties) to justify treatment. The greatest response was that of Minerva, with an average annual yield of 21·2 bush. per acre for ceresan and 19·7 for panogen as against 18·3 for the untreated, followed by Koto (19·5, 19·9, and 17·7, respectively); Redwood showed a good increase with 22·6, 22·1, and 20·9 bush., respectively. The average annual yield for all the varieties over the three-year period indicated that ceresan M was somewhat better than panogen (20·4 and 19·8 bush., respectively, against 19 for the untreated) and more economical.

Kerr (A.). **Foot rot of Flax caused by Ascochyta linicola.**—*Trans. Brit. mycol. Soc.*, 36, 1, pp. 61–73, 1 pl., 1 fig., 1953.

A review of the literature has revealed considerable confusion concerning the identity of the species of *Phoma* and related genera occurring on flax [*R.A.M.*, 31, p. 593]. Foot rot was very serious in Scotland, Wales, Somerset, and Dorset [cf. ibid., 27, p. 462] during 1939–45, when the flax acreage was greatly increased. In Scotland seedlings raised from infected seed or in infected soil are attacked at soil-level, fall over, and die. At this stage diagnosis is difficult though pycnidia may develop when infected seedlings are placed on moist filter paper in a Petri dish. Mature plants first display wilting and shrivelling of the lower leaves. A dark green area approximately 8 to 10 cm. long at the base of the stem rapidly turns yellow or brown, the cortical tissues bearing pycnidia often peeling away from the wood. Discoloured areas with pycnidia sometimes occur higher up the stem and on the sepals and capsule walls. Mycelium is sometimes found in the outer layers of the testa. Pycnidia develop readily on infected seeds germinated in a moist atmosphere. The dark brown, thin-walled, subepidermal pycnidia measured 100 to 320 by 77 to 300 (average 164 by 135) μ. Most of the spores were unicellular, elliptical, hyaline, typically biguttulate, and measured 5 to 8·6 by 2·6 to 3·9 (6·6 by 3·1) μ. One to 5 per cent. were bicellular and measured 8·7 to 11 by 3·3 to 4·2 (10·8 by 3·6) μ. A non-pathogenic *Phoma* sp. was frequently isolated from the apical portions of flax stems, pedicels, sepals, capsule walls, and seeds.

Taxonomic studies of isolates of *Phoma* and *Ascochyta* obtained from as many sources of flax as possible indicated that 'mort lin' in France [ibid., 28, p. 396], 'dodeharrel' in Holland, 'usychani lnu' in Czechoslovakia, 'Pustelkrankheit' in Germany, and foot rot in the British Isles are the same disease and all are attributed to *Ascochyta linicola* [loc. cit.]. Isolates from these sources all produced a small, more or less circular, hard, brown rot on potato tubers.

Wallace (Maud M.) & Diekmahns (E. C.). **Bole rot of Sisal.**—*E. Afr. agric. J.*, 18, 1, pp. 24–29, 3 figs., 1952.

Bole rot of sisal is causing increasing concern in most production areas of Tanganyika [*R.A.M.*, 30, p. 467]. Of the two kinds of rot recognized, the wet type [loc. cit.] almost always originates in cut leaf bases, spreading inwards and to adjacent leaf stumps. In longitudinal section there is no sharp differentiation

between rotted and healthy tissues. The dry type of rot [loc. cit.] affects uncut as well as cut plants. Both forms of the disease are fatal and *Aspergillus niger* [loc. cit.] was isolated from both. When affected boles were split and left for two days in an enclosed space almost the whole of the rotted surface became covered with fructifications of *A. niger*. It appears that both types are different manifestations of the same disease and that whether the rot is to be wet or dry possibly depends upon environmental factors or the chemical status of the plants.

In a field trial single leaves in different positions were cut from previously uncut $2\frac{1}{2}$-year-old sisal planted in single rows spaced 2·5 by 1 m. Some leaf stumps were left untreated and others were sterilized with 10 per cent. formalin, the remainder being inoculated with *A. niger* on 27th February, 1950. After eight weeks 50 per cent. of the inoculated plants displayed a positive 'take', with the rot spreading to other leaf bases. In 25 per cent. the inoculation had taken, but spread had become arrested, and in the remainder there was no take. There was no rot in the untreated plants or in those sterilized with formalin. Twelve weeks after inoculation the fungus could not be detected in the bole; after eight months the rot had become completely arrested, and there were never more than five leaf bases affected on one plant.

In a further field trial plants of the same planting age and spacing were heavily cut (to 12 leaves) and given the following treatments: A, none; B, sterilized with 0·1 per cent. mercuric chloride; C, lower leaf base inoculated (on 5th July, 1950); D, upper leaf base inoculated, corresponding treatments (E, F, G, and H) being given to lightly cut plants (to 24 leaves). Four months later the inoculated series C, D, G, and H had, respectively, 126, 194, 122, and 251 rotted leaf bases, representing 97·9, 74·5, 81·8, and 93·5 per cent. infection. After two months the numbers of inoculation 'takes' were, respectively, 47, 35, 36, and 44 and the number of leaf bases rotted 105, 104, 58, and 171. The appearance of several plants in which the fungus had spread to leaf bases completely surrounding the bole indicated that they would eventually succumb. No rot was present in the sterilized or in the untreated plants.

Where bole rot is prevalent cutting should be confined to the dry seasons. Further work is in progress.

Iron chlorosis in Hydrangeas.—*Gdnrs' Chron.*, Ser. 3, 134, 3475, p. 59, 3 figs. (on pp. 60, 62, and 63), 1953.

Promising control of iron chlorosis, to which the newer *Hydrangea* varieties [*R.A.M.*, 20, p. 205] are rather more susceptible than the older ones, was secured at the Experimental and Research Station, Cheshunt, with a sequestrol iron monopotassium complex (at 1:1,000 or 1:500) containing ethylenediamine tetra-acetic acid. This compound has recently been made available commercially by the Geigy Company, Ltd. The green colour of potted *Hydrangea* plants was fully restored, in some cases within five days, by saturating the soil with the weaker solution and in others after two or three weekly applications. The same treatment was effective with chlorotic *Primula obconica* [loc. cit.] but after a longer interval.

Beaumont (A.). **Diseases of Poppies.**—*Gdnrs' Chron.*, Ser. 3, 134, 3476, p. 71, 1953.

Oriental poppies (*Papaver orientale*) in England are attacked by *Verticillium dahliae* [cf. *R.A.M.*, 20, p. 118] and *Xanthomonas papavericola*. Downy mildew (*Peronospora arborescens*) [cf. ibid., 30, p. 216] attacks opium poppies (*Papaver somniferum*) as well as other species. Spraying the seed-bed with $\frac{1}{2}$ per cent. Bordeaux mixture or other copper fungicides is recommended for the control of this disease and leaf blight (*Helminthosporium papaveris*) [*Pleospora papaveracea*: cf. ibid., 32, p. 99], which was recorded in England for the first time in 1950.

Capoor (S. P.) & Varma (P. M.). **Studies on the 'distortion mosaic' virus of Datura inoxia Mill.**—*Indian J. agric. Sci.*, 22, 3, pp. 303–314, 2 pl., 1952. [Received August, 1953.]

A disease of *Datura inoxia* (hitherto erroneously referred to *D. alba*) in Bombay State, characterized by severe puckering and distortion of the leaves and flowers is designated *Datura* distortion mosaic virus (*Marmor daturae* n. sp.: *Datura* virus 3) [cf. *R.A.M.*, 29, p. 404]. It is transmitted readily by sap inoculation and by the aphids *Myzus persicae* and *Aphis gossypii* in nature. It is not seed-borne and infection appears to be confined to the Solanaceae, except for *Tetragonia expansa* on which concentric local rings are produced. The virus was inactivated by six days' exposure to air at room temperature and by desiccation at room temperature, especially when the process was slow and exceeded five days, but it withstood a temperature of 45° F. for more than 100 days and also complete desiccation at this temperature.

Delhaye (R. J.). **L'étude de la pourriture des inflorescences de Pyrèthre à la station de Mulungu.** [The study of inflorescence rot of *Pyrethrum* at the Mulungu Station.]—*Bull. Inform. Inst. Étud. agron. Congo belge*, 1, 4, pp. 305–320, 6 figs., 1952.

Pyrethrum (*Chrysanthemum cinerariifolium*) bud rot (*Ramularia bellunensis*) [*R.A.M.*, 31, p. 423] was found on material from Kiva and Ruanda, Belgian Congo, in 1947 [ibid., 28, p. 444]. Locally, the disease is estimated to halve total production, with a financial loss of 70,000,000 or more francs a year.

Observations begun at Tshibinda in 1948 showed that the greatest losses are sustained in the rainy season and the smallest in the dry. Infection is occasionally high during the dry season but only shortly after brief wet periods accompanied by strong sunshine and high temperatures. During the wet season all plantations should be properly drained. Careful attention should be paid to sanitary precautions whenever wet spells occur during the dry season and especially at the start of the rainy season. At the close of the wet season production should be abandoned in favour of regeneration. Attempts should be made to cultivate pyrethrum at lower altitudes.

Most growers have failed to practise rotation and have not fallowed their land. Green manuring, rotation, application of mineral fertilizers, and soil disinfection are all urgently needed. Young plants are more susceptible than old ones; infection becomes severe after production reaches a peak. Early clones are the most susceptible at Tshibinda, whereas some late ones are only very slightly affected, even when growing near a focus of infection. Growers should plant only highly productive material, preferably of known origin.

In spraying tests zerlate gave the best results, with a gross increase in yield of 70 per cent. and a reduction in the number of diseased organs of about 75 per cent. Applications at the rate of 50 kg. per ha. at Gishari were fatal to the plants.

All parasites that may weaken the plants, especially eelworms, should be kept down. Trial plots for the selection of resistant strains have been started in six different areas of the Colony and of Ruanda.

Hewlett (M. Ann). **Two leaf spots of Myrtle new to Great Britain, caused by the fungi Pestalotia decolorata and Cercospora myrti.**—*J.R. hort. Soc.*, 77, 11, pp. 413–418, 3 figs., 1952.

During the winter of 1950 several myrtle (*Myrtus communis*) plants, being raised for planting in public gardens at an English south coast resort, were affected by a severe leaf spotting followed by defoliation. Examination at the Wisley Laboratory showed *Pestalotia decolorata* [*R.A.M.*, 14, p. 84] to be responsible. Inoculations

with an aqueous spores suspension on wounded and unwounded leaves of healthy myrtle plants in a cold greenhouse gave positive results in autumn and early winter only.

In the summer and autumn of 1951 myrtle plants affected by leaf spot due to *Cercospora myrti* [cf. ibid., 9, p. 531; 17, p. 71] were received from two places in southern England. When an aqueous spore suspension was sprinkled on the leaves of healthy myrtle plants in a greenhouse at 45° to 50° F. typical symptoms developed in about a week on wounded leaves and in about ten days on uninjured ones. Infection was secured more readily on the lower surface than on the upper, and older leaves were more frequently attacked than young ones. Both diseases can be controlled by burning all fallen leaves and spraying the plants with colloidal copper or in the case of *C. myrti* with Bordeaux mixture. If the plants are severely infected cutting back may prove worth while. Infection is favoured by warm, close conditions, and where myrtles are raised under glass adequate ventilation must be provided.

Both diseases have since been detected on myrtle bushes growing out-of-doors.

Massey (Cynthia W.). **The anthracnose disease of Roses.**—*Amer. Rose Annu.*, 37, pp. 198–207, 1 fig., 1952.

The anthracnose disease of roses (*Sphaceloma rosarum*) [*R.A.M.*, 17, p. 683; 31, p. 185] is of wide occurrence, having been reported in many areas of the United States, most European countries, south America, Australia, Africa, and Asia. The disease is severe only on climbing roses in late summer. Lesions are produced on leaves and stems, and start producing spores four weeks after their first appearance and continue until the end of the season. Spores are dispersed by rain splashes and the fungus overwinters in the stem lesions. Control is effected by removal of infected stems during pruning and by frequent treatments with Bordeaux mixture, liquid lime-sulphur, sulphur-lead arsenate dust, or sulphur dust, especially during a wet summer.

Moore (W. C.) & Moore (F. Joan). **Downy mildew of Antirrhinum in England and Wales.**—*Plant Path.*, 1, 4, pp. 135–136, 1952.

Isolated attacks of *Antirrhinum* downy mildew (*Peronospora antirrhini*) [*R.A.M.*, 28, p. 346] occurred in Surrey and Lancashire in 1947. In April, 1949, reports of the disease arrived at the Plant Pathology Laboratory, Harpenden, Herts., in quick succession from several nurseries near the south coast. Within two or three weeks details of 11 outbreaks had been received, mainly from the coastal areas of the south and south-west, but also from Herefordshire, Gloucestershire, and North Wales. During each of the years 1950 to 1952 the fungus was recorded on about a dozen occasions, generally in April or May. So far, over 50 attacks have been recorded in 25 counties of England and Wales. About half were in coastal counties and three-quarters in the southern half of the country, but the disease is evidently well distributed. In most of the outbreaks the fungus had a very crippling effect on the young seedlings, normally raised under humid conditions. When raised under dry conditions the plants suffer little damage and usually outgrow the disease. Dark varieties appear to be affected less severely than pale ones, and later sowings less than early ones.

Marcelli (E.). **Un mosaico del Trifoglio ibrido riferibile al mosaico giallo No. 2 del Fagiolo.** [A mosaic of hybrid Clover attributed to the yellow mosaic virus No. 2 of Bean.]—*Notiz. Malatt. Piante, 1952*, 20, pp. 26–28, 1952. [English summary, p. 51. Mimeographed.]

During 1951, hybrid clover growing near Pavia, Italy, developed a yellow chlorosis of the leaves, and inoculations of healthy peas and beans [*Phaseolus vulgaris*]

with sap from diseased material reproduced the condition, which was closely similar to, if not identical with, that caused by bean yellow mosaic virus [cf. *R.A.M.*, 30, p. 325; 31, p. 587; 32, p. 383].

Noble (Mary), Robertson (N. F.), & Dowson (W. J.). **Verticillium wilt of Lucerne in Britain.**—*Plant Path.*, 2, 1, pp. 31–33, 1 pl. (between pp. 18–19), 1953.

Grimm lucerne growing in Scotland and in East Anglia developed a gradual wilt, the leaves succumbing from below upwards. A central brown discoloration of the tap-root gradually became more extensive. The wilting leaflets curled inwards and turned yellow, then white and dry. In subsequent years the affected plants became more stunted, the foliage being small and yellowish. *Verticillium albo-atrum* [cf. *R.A.M.*, 31, p. 476] was consistently isolated from infected material and inoculations of healthy lucerne caused typical symptoms, the fungus being re-isolated from the wilted plants.

Capoor (S. P.). **Observation on the sterility disease of Pigeon Pea.**—*Indian J. agric. Sci.*, 22, 3, pp. 271–274, 1 pl., 1952. [Received August, 1953.]

Most of this information concerning sterility of pigeon pea (*Cajanus cajan*) in Bombay, India, has already been noticed from another source [*R.A.M.*, 29, p. 405]. It is attributed to a virus for which the name 'pigeon pea sterility mosaic virus' is proposed. Some sterile plants grafted in 1947 produced a few flowering shoots in November, 1950. Forty seeds obtained from these plants were sown in September, 1951, and they all produced vigorous, healthy plants, none showing any sterility symptoms up to 155 days after germination.

Klomparens (W.) & Vaughn (J. R.). **The correlation of laboratory-screening of turf fungicides with field results.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 34, 4, pp. 425–435, 1 fig., 4 graphs, 1952.

Laboratory fungicide screening trials were carried out at East Lansing, Michigan, to evaluate the effectiveness of eight fungicides against the turf pathogens *Helminthosporium* [*vagans*: *R.A.M.*, 32, p. 131], *Sclerotinia homoeocarpa* [loc. cit.], *Gloeocercospora sorghi* [loc. cit.], and *Pellicularia filamentosa* [*Corticium solani*: loc. cit.]. Four replicates of plates containing 2 per cent. malt extract agar plus the fungicide (unautoclaved), which was serially diluted, were made for each of five concentrations. The plates, inoculated with 5 mm. disks taken from 5-day-old plates, were held at 29° to 30° C., linear growth increments being recorded at 24-hour intervals.

On the basis of the laboratory ratings and field tests in 1951 [ibid., 31, p. 331] concentrations of the fungicides giving 50 per cent. inhibition of fungal growth in Petri dishes can be recommended for field test control. Thus, seven of the fungicides used at 1·5 per cent. or less in the field and vancide 51 at 8 per cent. easily controlled *S. homoeocarpa*; calo-clor (3 per cent.) and tat-c-lect (0·3 per cent.) gave the best control of *C. solani*; actidione (3·5 per cent.) was the only one to control *H. vagans* in the field, but vancide 51 proved of some value too at 9 per cent. and also at 15 per cent. against *G. sorghi*, which was best controlled by actidione (2·5 per cent.) and tat-c-lect (0·7 per cent.).

Luttrell (E. S.). **Spot blotch of Brome grasses, Tall Fescue grass, and Barley.**—*Plant Dis. Reptr*, 37, 3, pp. 150–151, 1953. [Multilithed.]

At the Georgia Experiment Station, Experiment, a comparison was made of the morphology and pathogenicity of isolates of *Helminthosporium sativum* [*R.A.M.*, 30, p. 472] from tall fescue grass (*Festuca arundinacea*), smooth brome grass (*Bromus*

inermis), fescue grass (*B. catharticus*), and barley [ibid., 32, p. 14]. The symptoms on *B. inermis* and *B. catharticus* resembled those on barley, susceptibility of the three hosts being similar. *F. arundinacea*, on the other hand, usually developed only a few small spots per leaf and was highly resistant. Cross-inoculations gave little indication of host specificity.

Meiners (J. P.). **Seed treatment for control of head smut in Mountain Brome in 1952.**—*Plant Dis. Reptr*, 37, 3, pp. 152–153, 1953. [Multilithed.]

Of the seven fungicides tested at Pullman, Washington, for the control of head smut (*Ustilago bullata*) on the Bromar variety of mountain brome grass [*Bromus marginatus*: *R.A.M.*, 31, p. 493], ceresan M slurry and dust (0·5 to 2 oz. per bush.) and panogen slurry and dust (0·75 to 1·5 oz.) gave adequate control (0 to 3·6 and 0·1 to 1·6 per cent. infection, respectively, as against 97 per cent. for the untreated). Mergamma dust and liquid vancide 51 (both at 6 oz.) allowed 1·1 and 3·5 per cent. smut, respectively, and caused some reduction in stand. Arasan (1 to 6 oz.) gave poor results and is no longer recommended.

Owen (H.). **Leaf blotch of Cocksfoot.**—*Plant Path.*, 1, 4, p. 122, 1952.

In studies in the Department of Agricultural Botany, University of Reading, *Rhynchosporium secalis* was isolated from barley, rye, *Agropyron repens* [*R.A.M.*, 24, p. 177], *Bromus mollis*, and *Hordeum murinum* [loc. cit.], all with leaf blotch symptoms. The conidia on numerous collections of *Dactylis glomerata* [loc. cit.] with leaf blotch from the Reading area were invariably cylindrical, lacking the beak of *R. secalis*, and the isolates differed culturally from those from other grasses. This material appeared to belong to *R. orthosporum* [ibid., 17, p. 22], not before recorded in Britain, the conidia measuring 14·5 to 21 by 2·5 to 4·8 μ (20 spores in water). *R. orthosporum* was also found recently on *D. glomerata* from Norfolk. A culture from *D. glomerata* failed to infect barley or *H. murinum* in inoculation tests.

Smith (K. M.). **A virus disease of Cocksfoot.**—*Plant Path.*, 1, 4, p. 118, 1 pl., 1952.

During the summer of 1950 one or two plants of *Dactylis glomerata* with unusual symptoms were received from the vicinity of Leeds. Pale streaks on the younger leaves became more intense and gradually spread throughout the plant. Outdoor plants displayed a conspicuous longitudinal streaking of dark and light green or yellow. The condition was ascertained to be due to a sap-transmissible virus for which the name 'cocksfoot streak' is proposed. Under good growing conditions in April symptoms sometimes appeared in ten days, but during winter in the glasshouse the period might be several weeks. All attempts to transmit the virus to plants other than *D. glomerata* failed. In tests of insect transmission successful infections were given by *Myzus persicae* and *Macrosiphum euphorbiae*. Of several hundred plants raised from seed from infected plants only one was affected.

Shaw (Dorothy E.). **Ropy smut of Liverpool plains grass.**—*Proc. Linn. Soc. N.S.W.*, 77, 3–4, pp. 142–145, 1 pl., 1 fig., 1952.

A smut attacking the stems of *Stipa aristiglumis* on the north-western slopes of New South Wales is described. The name *Tolyposporium restifaciens* n. sp. is proposed for the fungus.

Thirumalachar (M. J.), Shaw (C. G.), & Narasimhan (M. J.). **The sporangial phase of the downy mildew on Eleusine coracana with a discussion of the identity of Sclerospora macrospora Sacc.**—*Bull. Torrey bot. Cl.*, 80, 4, pp. 299–307, 6 figs., 1953.

A detailed study was made of the sporangial stage of *Sclerospora macrospora* on

Eleusine coracana in India [*R.A.M.*, 29, p. 511], which developed in the laboratory on the ventral surface of spikelets kept in a moist chamber at 60° to 68° F. Mature sporangia were lemon-shaped with an apical papilla and a pedicel-like hypha at the base and measured 60 to 100 by 43 to 64 μ [ibid., 20, p. 457]. As the morphology of the sporangial phase and the method of oospore germination (by zoospores) distinguish the fungus from *Sclerospora* and the thick oogonial wall excludes it from *Phytophthora* [loc. cit.] a new genus *Sclerophthora* is erected and the fungus designated *S. macrospora* n. comb. as the type species.

Home orchard spray schedule.—*Pamphl. agric. Ext. Serv. Iowa St. Coll.* 175, 6 pp., 15 figs., 1952.

Spray programmes are presented for the control of insect and fungus pests of tree and bush fruits and vines in home orchards and gardens in Iowa, together with brief directions for preparing and applying the materials.

No scab at C.W.S. fruit farms in Herts.—*Comm. Gr., 1953*, 3009, p. 391, 1953.

Though apple scab [*Venturia inaequalis*: *R.A.M.*, 32, pp. 23, 488, 568] was prevalent in almost every fruit-growing district of England during 1953 no trace was present at the large Stonebury and Mutford farms of the Co-operative Wholesale Society, Ltd., at Buntingford, Herts. Most of the fruit was Cox's Orange on types II and IX with some Worcester and James Grieve. The spraying programme, carried out on contract by Pest Control, Ltd., consisted of four pre-blossom applications of lime-sulphur and three post-blossom with wettable sulphur.

Sharvelle (E. G.). **Effect of summer fungicides on the finish of russet-sensitive Apples.**—*Plant Dis. Reptr*, 37, 4, pp. 232–234, 4 figs., 1953. [Multilithed.]

In further studies at Purdue University Agricultural Experiment Station, Lafayette, Indiana on the control of summer diseases of apples [cf. *R.A.M.*, 32, p. 568] including black pox (*Helminthosporium papulosum*), sooty blotch (*Gloeodes pomigena*), *Botryosphaeria* rot (*B. ribis*), and black rot (*Physalospora obtusa*) [loc. cit.], orthocide 406 at 1 and 2 lb. per 100 gals. for the summer cover sprays gave good control of the diseases and less russeting on Golden Delicious and Grimes Golden than Bordeaux and sulphur sprays.

Keener (P. D.). **A species of Gymnosporangium on Quince, Pear and Hawthorn in Arizona.**—*Plant Dis. Reptr*, 37, 4, p. 235, 2 figs., 1953. [Multilithed.]

Severe rust attacks due to a species of *Gymnosporangium* were reported in Arizona in 1951 and 1952 on quince leaves and fruit [cf. *R.A.M.*, 32, p. 489], English hawthorn (*Crataegus oxyacantha*), and (to a lesser extent) pears. Quince and pear fruits were rendered unfit for human consumption. Several species of *Juniperus*, abundant in the same localities, are believed to serve as alternate hosts.

Crosse (J. E.). **Bacterial diseases of stone-fruit trees in Britain. IX. Bacteriosis of Apricot.**—*Trans. Brit. mycol. Soc.*, 36, 1, pp. 38–45, 1 pl., 1953.

In 1949 two- to four-year-old apricot trees of the varieties Moorpark, Early Moorpark, Ansu, Croughton, and Bradbourne growing at East Malling, Kent, were affected by a hitherto unrecorded disease caused by *Pseudomonas mors-prunorum* [cf. *R.A.M.*, 21, p. 461; 31, p. 171]. Severe leaf-spotting was accompanied in early May by die-back of one-year-old branches and, following a period of cold wet weather later in the month, by extensive wilting of the young shoots.

Individual leaf infections appeared first as small, reddish-purple spots with necrotic centres. As they enlarged to 0·5 to 3 mm. the surrounding pigmentation generally disappeared. In the variety Ansu, however, the purple discoloration

persisted, frequently coalescing to form irregular patches enveloping two spots or more. In some varieties the pigmentation was replaced by a faint yellow halo. Shoots displayed two distinct symptom pictures. Infection near the apex resulted in girdling and a typical tip wilt; the girdling advanced downwards with accompanying defoliation and killed the shoots. Secondary shoots frequently developed below the lesion. On harder tissues only localized lesions, from 3 to 40 mm. long and not girdling the shoot, developed. They eventually blackened and split to form elliptical cankers. Severe defoliation occurred when shoots sustained several lesions, though the apices remained healthy. Globules of bacterial ooze exuded from infected shoots kept under damp conditions. One-year-old branches were girdled by lesions 12 to 20 cm. long, marked by a characteristic shiny, wrinkled appearance and chocolate brown discoloration of the periderm and buds. Smaller lesions occurred below the main one, generally around the base of a dead bud. The latter, however, had been only recently invaded and did not appear to be the original sources of infection, which may have entered through the leaf scars [cf. ibid., 30, p. 618]. Bacteria were readily distinguished in the dead buds and the diseased tissue at their base. The die-back and leaf-spotting recurred in 1950 and 1951 but were generally less severe than in 1949. Field observations and inoculation experiments suggest that Croughton is comparatively resistant and Moorpark susceptible.

Cross-inoculations of apricot leaves, shoots, and branches with isolates from all three sources produced typical symptoms and confirmed that the three types of infection are phases of the same disease.

In December, 1950, five strains of *P. mors-prunorum* from each of plum, cherry, and apricot, mostly isolated from leaf spots, were inoculated into branches of comparable age on each host and the length of the resulting cankers measured in the following May. The cherry strains were more pathogenic to cherry than to apricot, while the reverse was true of the apricot strains. Comparatively small lesions resulted from the inoculations on plum [ibid., 24, p. 454]. These results demonstrate conclusively the existence of pathogenic strains and indicate a considerable degree of parasitic adaptation to the different hosts.

Woodbridge (C. G.) & McLarty (H. R.). **Further observations and investigations on manganese deficiency in fruit trees in British Columbia.**—*Canad. J. agric. Sci.* [formerly *Sci. Agric.*], 33, 2, pp. 153–158, 6 pl., 1953.

Manganese deficiency symptoms, though slight, were observed on 14 additional species, including cherry, raspberry, vine, pear, plum, filbert [*Corylus*], walnut, chestnut, and spinach, in many widely separated areas of the Okanagan and adjacent valleys in British Columbia [*R.A.M.*, 31, p. 438]. Some species displayed poor leaf development, chlorosis, and necrosis of some tissues. On peach leaves a shot-hole condition was common, some of the leaves being small, twigs dying-back, and the tree being ultimately killed. Inward and upward rolling of the leaf margins were characteristic of the severe deficiency on Chinese chestnut [*Castanea mollissima*]. Symptom expression was found to be associated with a low manganese content of the leaves. In control experiments tecmangam (67 per cent. manganous sulphate, $\frac{1}{4}$ lb. per 100 gals.) resulted in effective recovery of moderately affected trees, and 2 lb. alleviated more severe cases. Tecmangam was safe to use in a mixture with DDT or parathion under the conditions of the experiment.

Posnette (A. F.). **Green petal—a new virus disease of Strawberries.**—*Plant Path.*, 2, 1, pp. 17–18, 1 pl., 1953.

Strawberry green petal disease [*R.A.M.*, 31, p. 558] was first observed by the author in May, 1951, when two affected plants were discovered in a two-year-old field of 7,000 Auchincruive Climax near Sutton Valence, Kent. Later in the year

the disease was recorded in other Kentish fields and from different counties. The number of affected plants in any field was generally under ten, and these were scattered, single plants. Many more cases were seen in 1952, both on Climax and on Cambridge Seedling, and the prevalence of the disease would appear to be increasing.

On Climax the sepals are enlarged. Some flowers develop the normal number of ovules, but as a rule few seeds form and some flowers are sterile. The fruit seldom ripens, the achenes standing out from the receptacle, which shrivels before maturity; the dried inflorescences are a useful symptom in field diagnosis. The mature leaves are dull yellowish or olive green, later bright red, particularly in August and September. The leaves formed after infection are much dwarfed and slightly cupped, the main veins and margins being yellow. There is an extreme contrast between the long petioles of the old leaves and the short ones of the young. Soon after the small leaves have appeared the older ones wilt and shrivel. The entire plant may collapse and die in July or August, though sometimes it recovers temporarily in September, with the formation of secondary crowns with minute leaves. It is believed that Climax plants which display flower symptoms in June almost always die before October. The stolons of infected plants are short and thick and the young runner plants much dwarfed [cf. ibid., 31, p. 337].

In May, 1952, two virus-free Climax plants were stolon-grafted to an affected plant in a stock bed and ten weeks later symptoms appeared on the test plants. Graft transmission was also secured from an infected Cambridge 422 plant. Transmission tests with *Pentatrichopus fragaefolii* gave negative results. Despite its comparative rarity at present, green petal must be considered to be, potentially, one of the most serious of strawberry diseases.

Hickman (C. J.) & Goode (Pamela M.). **A new method of testing the pathogenicity of Phytophthora fragariae.**—*Nature, Lond.*, 172, 4370, pp. 211–212, 1953.

The following more rapid method for testing the pathogenicity of the strawberry red core pathogen, *Phytophthora fragariae* [*R.A.M.*, 31, p. 23], was evolved in the Department of Botany, University of Birmingham. The roots were immersed in an active zoospore suspension for about 24 hours and the runners then planted in sand, five to a pot, for about 12 days, by which time susceptible varieties showed pronounced wilting. The inoculum was prepared by submerging two bean agar plate colonies in 500 ml. pond water (just below the surface) at 10° to 15° C.

Waldo (G. F.). **Source of red stele root disease resistance in breeding Strawberries in Oregon.**—*Plant Dis. Reptr*, 37, 4, pp. 236–242, 1953. [Multilithed.]

In breeding work at the Oregon State College, Corvallis, for the development of strawberry varieties resistant to red stele [red core: *Phytophthora fragariae*: *R.A.M.*, 32, p. 388] some hybrid selections from crosses between the native strawberry, *Fragaria chiloensis*, and standard varieties maintained vigour and resistance through several generations. Resistance genes are believed to be associated with those for vigour or inherited in the same manner. It is suggested, however, from observations made during the last ten years of breeding, that resistance is a matter of degree, depending, possibly, on the rate of growth of the fungus in the root as well as on the age of the root and on environmental conditions.

Kronenberg (Hester G.). **Selection and certification of clonal stocks of Strawberry varieties.**—*Euphytica*, 2, 2, pp. 147–148, 1953.

Field trials for the special AA certificate, valid for three years, which is granted by the Netherlands General Inspection Board for Arboriculture in respect of

strawberry clones reaching an approved standard of productivity and health, are carried out in three localities in Holland, viz., on sandy soil at Wageningen and in eastern Brabant, on river silt in the Bommelerwaard, and on sea silt in the Hoekse Waard. The Juanda and Oberschlesien varieties suffer heavy damage from *Verticillium* wilt [*R.A.M.*, 28, p. 180] on river silt.

Many of the approved clones are still not entirely free from virus infection, and the performance of Madame Moutot is apt to be disappointing, since June yellows [cf. ibid., 30, p. 65; 31, p. 558] may develop suddenly in the most carefully selected clones.

Diéguez C. (J.). **Epiphytotic outbreak of Sigatoka disease at Tingo María region, Peru.**—*Plant Dis. Reptr*, 37, 3, pp. 166–167, 1953. [Multilithed.]

Banana sigatoka disease (*Cercospora musae*) [*Mycosphaerella musicola*: C.M.I. map No. 7], first observed in the Tingo María region of Peru in 1946, has spread rapidly since 1950 in both young and old plantations. Good soil conditions are no longer a deterrent to the fungus, and Bordeaux mixture sprays are uneconomic. Banana production in this region is no longer profitable.

Marcelli (E.). **Un'alterazione delle Banane provenienti dalla Somalia causata dal Gloeosporium musarum Cooke et Massee.** [A disorder of Banana from Somaliland caused by *Gloeosporium musarum* Cooke & Massee.]—*Notiz. Malatt. Piante, 1952*, 20, pp. 22–26, 1952. [English summary, p. 50. Mimeographed.]

Notes are given on the salient features of banana anthracnose (*Gloeosporium musarum*) [cf. *R.A.M.*, 26, p. 456; 32, p. 324] found on material from Italian Somaliland.

Stover (R. H.). **Measurement of colonization and survival of soil Fusaria in detached plant tissue.**—*Nature, Lond.*, 172, 4375, p. 465, 1953.

In studies on the effect of soil moisture on the survival of *Fusarium oxysporum* f. [var.] *cubense* in colonized banana roots [*R.A.M.*, 32, p. 574] carried out in the Tropical Research Department, United Fruit Company, La Lima, Honduras, the fungus developed rapidly and abundantly in agar plates containing decayed colonized roots which had been finely cut in a Waring blendor and diluted with water. This method has been found to provide an improved quantitative analysis of *Fusarium* growth and survival in colonized roots. Mycelial fragmentation results in a much higher colony count than would be obtained by other methods. The fungus survived in colonized roots even after treatments that eradicated it from the surrounding soil, i.e., submerging soil and roots for three months under two inches of water [cf. ibid., 32, p. 135] with or without sodium nitrate, and saturating the soil with water containing 400 p.p.m. of various fungicides. So far cyanamide at 2,500 lb. per acre and 1 per cent. formaldehyde drench have drastically reduced *Fusarium* survival in colonized roots in the laboratory.

C[iferri] (R.). **Proposte per l'unificazione dei nomi di principi attivi degli antiparassitari in lingua italiana.** [Proposals for the unification of the names of the active principles of anti-parasitics in Italian.]—*Notiz. Malatt. Piante, 1952*, 20, pp. 44–50, 1952. [English summary, p. 51. Mimeographed.]

The generally accepted names (sometimes with slightly modified spelling to conform with Italian usage) of ten fungicides not available before the war but now widely used are listed with other foreign names (if different) and the chemical name of the active ingredient.

Ludwig (R. A.) & Thorn (G. D.). **Studies of the breakdown of disodium ethylene bisdithiocarbamate (nabam).**—*Plant Dis. Reptr*, 37, 3, pp. 127–129, 1 graph, 1953. [Multilithed.]

Preliminary studies on the breakdown of nabam [cf. *R.A.M.*, 31, p. 193] at the Science Service Laboratory, London, Ontario, showed that a yellow, crystalline, relatively water-insoluble precipitate of high fungitoxicity developed in a 100 p.p.m. nabam solution after 44 days. A quantity of the precipitate obtained by a large-scale method proved fairly highly fungitoxic, though a little less potent than solutions of nabam itself. Considerable potency remained in the mother liquor, which contained ethylene thiourea and ethylene thiuram monosulphide.

Martin (J. T.). **Distribution of copper fungicide deposits on plant surfaces.**—*Nature, Lond.*, 172, 4372, pp. 313–314, 2 figs., 1953.

Chemical paper tests for assessing and recording the distribution of copper fungicide deposits on plant surfaces [*R.A.M.*, 32, p. 326] are not entirely satisfactory as they miss accumulations in depressions. In a new method devised at Long Ashton Research Station, Bristol, the plant surface is gently pressed into calcium sulphate cream, taking care to avoid the occlusion of air and allowing the plaster to harden for about 20 minutes. The plant material is then peeled off and the cast wetted with 0·2 per cent. aqueous sodium diethyldithiocarbamate. A comparison of intensity of coloration at different points of the cast with that from standardized droplets of the same fungicide on the same surface gives an approximate quantitative assessment of distribution.

This technique was also used for lime-sulphur deposits by employing a cream containing 0·5 per cent. silver nitrate solution, immersing the cast in a solution of sodium thiosulphate and potassium metabisulphite, and washing well in running water. It has been used successfully in recording the levels and distribution, following different treatments, of copper deposits on bean, potato, tomato, and banana leaves, and of lime-sulphur on apple leaves and small fruits.

Weber (G. F.). **A half century of plant pathology in the south.**—*Plant Dis. Reptr*, 37, 4, pp. 249–257, 1953. [Multilithed.]

This is a brief survey of the development of plant pathology during the last 50 years in the southern United States. Each of the 15 States is dealt with separately.

Nance (Nellie W.). **Some new or unusual records and outstanding features of plant disease development in the United States in 1951.**—*Plant Dis. Reptr, Suppl.* 214, pp. 142–162, 8 maps, 1952. [Multilithed.]

This summary of the outstanding disease occurrences in the United States for 1951 [cf. *R.A.M.*, 32, p. 580] is largely based on the reports to the Plant Disease Survey and articles in *Phytopathology*, most of which have been noticed in this *Review*. Weather conditions in relation to plant diseases are briefly reviewed and an annotated list is given of diseases new to the country and new State host records. A short section is devoted to virus diseases, other diseases being treated under host headings.

Brian (P. W.). **Microbiology.**—*J.R. Soc. Arts*, 101, 4893, pp. 194–224, 1953.

This paper covers the three Cantor lectures given to the Royal Society on 17th and 24th November and 1st December, 1952. The first describes the general groups of microflora and microfauna and their modes of nutrition. In the second microbiological activity under natural conditions is discussed, including the relationship between soil micro-organisms and plant diseases. The last lecture is a general

review of the applications of microbiology to industry, in the production of food, fermentation processes, and antibiotics [cf. *R.A.M.*, 32, p. 590].

Kominami (K.). **An additional list of cultures maintained in the Japanese type culture collection, Nagao Institute, Kitashinagawa, Tokyo. Supplement 1 (Dec. 1950-May 1952).**—*Nagaoa* (*Mycol. J. Nagao Inst., Tokyo*), *1952*, 1, pp. 40–81, 1952.

This list includes 364 species and strains of fungi which have been added to the Japanese Type Culture Collection since the publication of the last list in 1950, and a number of corrections. The genera are arranged in alphabetical order.

Capoor (S. P.). **Culture box: a practical device for collecting, preserving, and transporting virus affected plant materials.** *Indian J. agric. Sci.*, 22, 3, pp. 299–302, 1 fig., 1952. [Received August, 1953.]

The author describes the construction of a culture box for preserving and transporting virus affected plant material on collecting trips. It is a portable wooden cabinet 11 by 10 by 4 in. containing twelve 8 by 1 in. plugged, sterilized glass tubes supported by holes in a shelf at the top and resting in depressions in the base. Both the lid and front are hinged for opening. At the bottom of each tube is a plug of cotton wool just submerged in water or nutrient solution. Cuttings stored in the box for periods up to 90 days could be grafted successfully.

Krasil'nikov (N. A.). Микробы-антагонисты и антибиотические вещества в растениеводстве. [Antagonistic micro-organisms and antibiotic substances in plant cultivation.]—Изв. Акад. Наук СССР [*U.S.S.R. Acad. Sci. News* = *Bull. Acad. Sci. U.S.S.R.*], *1953*, 2, pp. 49–66, 1953.

This is a general review of the work done in the U.S.S.R. and other parts of the world on antagonistic micro-organisms. The use of these organisms in the soil and the application of antibiotics to the control of plant diseases are dealt with in some detail [*R.A.M.*, 32, p. 204 and next abstract]. A bibliography of 40 titles is appended.

Mirzabekyan (R. O.). Микробы-антагонисты и их антибиотические вещества в борьбе с фитопатогенными микробами. [Antagonistic micro-organisms and their antibiotic substances in the control of phytopathogenic micro-organisms.]—Изв. Акад. Наук СССР [*U.S.S.R. Acad. Sci. News* = *Bull. Acad. Sci. U.S.S.R.*], *1953*, 2, pp. 67–88, 15 figs., 1953.

Most of this information on the inhibitory activity of antibiotics against apricot wilt (*Bact*[*erium*] *armeniaca*), cotton gummosis [blackarm] (*Pseud*[*omonas* = *Xanthomonas*] *malvacearum*), and citrus necrosis (*P. citriputeale*) [*P. syringae*] has already been noticed from another source [*R.A.M.*, 31, p. 621 and preceding abstract]

Darpoux (H.), Faivre-Amiot (A.), Ridé (M.), & Roux (L.). **Étude des propriétés antagonistes et de quelques produits du métabolisme d'une souche d'Alternaria solani (E. et M.) Jones et Grout.** [A study of the antagonistic properties and some metabolic products of a strain of *Alternaria solani* (E. & M.) Jones & Grout.]—*Ann. Inst. nat. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 3, 4, pp. 423–487, 14 figs., 30 graphs, 1952.

In this expanded account of work at the Central Station of Plant Pathology, Versailles [*R.A.M.*, 30, p. 335], strain No. CD 32 of *Alternaria solani* is reported to exert an antagonistic action on a number of organisms in addition to those already mentioned, including *Sclerotinia libertiana* [*S. sclerotiorum*] and *Endothia parasitica*. Instances of mutual antagonism were noted. The culture filtrate was active against

all these organisms and also *Corynebacterium sepedonicum*, *C. flaccumfaciens*, *Pseudomonas angulata*, *Armillariella* [*Armillaria*] *mellea*, *S. minor*, and *Sclerotium rolfsii*. The most active substance extracted from the culture fluid, alternarine [loc. cit.], was a hard, colourless gum, soluble in water only with difficulty, very stable in air, and retaining some activity in dilute solution even after autoclaving at 120° [C.].

Another substance, crystallizing in fine needles, was active at a concentration of 100 μg. per ml. against *S. rolfsii* and *Sclerotinia fructigena*; it differed from alternaric acid [ibid., 32, pp. 270, 517].

The optimum conditions for the production of alternarine were a temperature of 23° to 24°, age of culture 14 to 18 days, initial pH 6·5 to 7·5, saccharose concentration 50 gm. per l., an organic source of nitrogen, thickness of the medium (300 ml. of medium per Roux's dish), and shaking the cultures (optimum activity in 5 or 6 days); many natural media gave excellent results. *Xanthomonas malvacearum* was inhibited at 50 μg. per ml. and *X. campestris* at 100 μg. Activity was reduced by serum and peptone.

No injury was caused to tomato plants with 4 leaves, tobacco (8 to 12 leaves), French bean (*Phaseolus vulgaris*, 4 leaves), *Pelargonium zonale* (mature), or cabbage (4 months) by spraying with a solution of 100 mg. per l. No ill effects resulted when seeds of various plants were steeped for 24 hours in a culture extract of *Alternaria solani* or in a 200 mg. per l. solution of alternarine, though a medium containing alternarine at this concentration greatly reduced germination.

Mirić (Mirjana) & Dunegan (J. C.). **An antibiotic substance toxic to Xanthomonas pruni produced by Aspergillus niger.**—*Plant Dis. Reptr*, 37, 3, pp. 157–158, 1 fig., 1953. [Multilithed. Serbo-Croatian summary.]

In co-operative studies at the Institute of Plant Protection, Belgrade, Yugoslavia, and the Bureau of Plant Industry, Beltsville, Maryland, *Aspergillus niger* [cf. *R.A.M.*, 25, p. 514], grown on beef extract broth plus 2 per cent. dextrose or on Czapek's solution, was found to form within 72 hours an antibiotic substance toxic to *Xanthomonas pruni*. The substance is thermostable and retains activity in ageing cultures.

Kuraishi (H.). **Studies in mycorrhizal fungi I. Occurrence, environment and development of Armillaria robusta.**—*Ecol. Rev.*, 13, 3, pp. 159–166, 4 graphs, 1953.

According to Masui (*Mem. Coll. Sci. Kyoto*, Ser. Bot., 3, pp. 149–279, 1927), *Armillaria robusta* resembles *A. matsutake* [*R.A.M.*, 20, p. 599 and next abstract] in forming ectotrophic mycorrhiza with *Pinus densiflora*. It was also found in association with *Tsuga sieboldii*. In studies during 1949–50 at Kyôto University and later at Tohôku University *A. robusta* was unable to grow at temperatures above 30° C. and was killed outright above 39°. The optimum pH in culture lay between 4·5 and 4·9.

Levisohn (Ida). **Growth response of tree seedlings to mycorrhizal mycelia in the absence of a mycorrhizal association.**—*Nature, Lond.*, 172, 4372, pp. 316–317, 1 fig., 1953.

Pot culture experiments at Bedford College, London, demonstrated the growth stimulation of an endotrophic tree species by an ectotrophic mycorrhiza although it did not form an association with the roots. An unsterilized poor heathland soil free from the mycelium of the ectophyte *Rhizopogon luteus* [*R.A.M.*, 25, p. 518] and from a mycorrhizal associate of *Chamaecyparis lawsoniana* was used, as it produced poor growth in the control plants. It was inoculated with *R. luteus* in the

form of mycorrhizal roots of Scots pine surface-sterilized with mercuric chloride. At the end of the first season there was marked stimulation of root and shoot development in the inoculated series of *C. lawsoniana*.

KURAISHI (H.) & NARITA (D.). **Studies in mycorrhizal fungi II. An Armillaria species locally known as 'baka-matsutake' and its habitat.**—*Ecol. Rev.*, 13, 3, pp. 169–176, 1 pl., 1 graph, 1953.

Notes are given on the ecology, morphology, and conditions favouring an *Armillaria* sp. closely resembling *A. matsutake* [see preceding abstract], known locally in the western part of Aomori Prefecture as 'baka-matsutake'; it appears to form mycorrhiza with oaks (*Quercus crispula*, *Q. dentata*, and *Q. serrata*).

RAPER (K. B.) & FENNELL (DOROTHY I.). **Heterokaryosis in Aspergillus.**—*J. Elisha Mitchell sci. Soc.*, 69, 1, pp. 1–29, 4 pl., 1 fig., 5 diags., 1953.

The formation of heterokaryotic heads in *Aspergillus fonsecaeus*, *A. clavatus*, *A. fumigatus*, and *A. terreus* when mutant strains or mutant and parent strains are grown in mixed culture has been demonstrated. The pattern of development coincides with that previously reported by other investigators [cf. *R.A.M.*, 32, pp. 28, 580].

DRECHSLER (C.). **Development of Pythium debaryanum on wet substratum.**—*J. Wash. Acad. Sci.*, 43, 7, pp. 213–225, 6 figs., 1953.

In this paper are described some additional aspects of the development of *Pythium debaryanum* in water. The isolate used in previous studies [*R.A.M.*, 32, p. 161] was grown on irrigated pieces of maize meal agar, and another strain, obtained in May, 1922, from a softened pea root near Madison, Wisconsin, was grown on irrigated slabs of Lima bean agar.

In water the antheridial branches are longer and the antheridia narrower than on solid media. Although smooth oogonia predominated, a few bore up to three protuberances. The oogonia in a culture of *P. irregulare* (Buisman's isolate obtained from the Centraalbureau voor Schimmelcultures) grown under similar conditions displayed no more ornamentation than is generally observed in the isolates with relatively smooth oogonia assigned to *P. debaryanum*. Buisman distinguished *P. irregulare* from *P. debaryanum* chiefly on account of the oogonial protuberances. In some of her specimens the departures from the usual globose or ellipsoidal shape were probably due to the collapse of the oogonial wall, a feature which can be quite marked in *P. debaryanum* also.

In central and northern latitudes the species treated herein as *P. ultimum* and *P. debaryanum*, together with *P. irregulare*, are virtually the only damping-off parasites having relatively smooth oogonia and subglobose sporangia. The author considers that De Bary's account of the damping-off fungus he took to be *P. debaryanum* may be safely understood as relating unambiguously to *P. ultimum*. In *P. debaryanum* zoospores are produced readily and the antheridium is borne terminally on a branch arising on the oogonial hypha at a distance about equal to the oogonial diameter. *P. ultimum* rarely produces zoospores from the vegetative elements of the mycelium and possesses antheridia consisting of an adjacent hyphal segment or a lateral pouch-like cell arising in close proximity to the oogonium.

ENOMOTO (S.). **The spore formation of smut fungi on artificial culture media.**—*Mem. Fac. Agric. Hokkaido Univ.*, 1, 3, pp. 256–273, 1953. [Japanese, with English summary.]

In the spring of 1936 resting spores of *Ustilago nuda* and *U. hordei* developed on 'amazake' extract agar. Further investigation demonstrated that the conditions necessary for the production of resting spores of smut fungi on artificial media were

as follows: the sugar content should be over 5 per cent., the optimum lying between 15 and 25 per cent.; the content of nitrogenous compounds should be under 0·2 per cent.; a strain easily producing resting spores on such a medium should be used; and incubation should be carried out at a temperature suitable for spore development.

The author obtained resting spores of 19 species of smuts belonging to six genera. The spores produced in culture did not differ morphologically from those found on the host, but the former are not chlamydospores, being produced endogenously in swollen mycelial cells resembling chlamydospores.

Salzmann (R.). **Kann die Ausbreitung der Viruskrankheiten der Kartoffel auf dem Feld durch Bekämpfung der Blattläuse verhindert werden?** [Can the spread of Potato virus diseases in the field be prevented by aphid control?]—*Mitt. schweiz. Landw.*, 1, 7, pp. 97–103, 6 graphs, 1953.

The results of experiments carried out at the Agricultural Research Institute, Zürich-Oerlikon, from 1950 to 1952 on the prevention of potato viroses by insecticidal control of *Myzus persicae* and *Doralis* [*Aphis*] *rhamni* [*R.A.M.*, 32, p. 302] were not encouraging [cf. ibid., 32, p. 445 and next abstract]. The method is considered unlikely to prove effectual for the small-scale cultivation generally practised in Switzerland, where proximity to contaminated stands and relatively heavy aphid colonization must nearly always be taken into account, and even for large areas its profitability is regarded as questionable. Early harvesting is a reliable means of control [ibid., 30, p. 65; 32, p. 500] if supplemented by stringent sanitary precautions.

Lambers (H. R.), Reestman (A. J.), & Schepers (A.). **Insecticides against aphid vectors of Potato viruses.**—*Netherlands J. agric. Sci.*, 1, 3, pp. 188–201, 2 diags., 1953.

Periodical applications of systox [*R.A.M.*, 32, p. 498] to Bintje potato plots in Holland markedly reduced the spread of potato leaf roll virus within though not into the field, but exerted scarcely any influence on the dissemination of potato virus Y [cf. preceding abstract]. Alate aphids, particularly *Myzus persicae* and *Aphis nasturtii*, proved unexpectedly important in virus transmission.

The toxicity of systox to human beings is a great drawback to its large-scale use in the field, and a more practical method consists in the spraying of individual infected or suspected plants, which then cease to be a potential danger to their neighbours. A dye may be added to the spray mixture to facilitate the subsequent roguing of the plants by non-specialists.

Ross (A. F.). **Physalis floridana as a local lesion test plant for Potato virus Y.**—*Phytopathology*, 43, 1, pp. 1–8, 3 graphs, 1953.

At Cornell University, Ithaca, New York, a sufficient number of lesions for quantitative work developed on *Physalis floridana* inoculated with potato virus Y [*R.A.M.*, 30, p. 506; 32, p. 274, and next abstract] provided the plants had been kept growing vigorously and given extra light during the winter months. Lesion production was stimulated by the use of carborundum, by shading, and by post-inoculation temperatures between 65° and 70° F.; there was no response at or above 80°. A rapid progressive reduction in lesion count followed the continued use of inoculating pads without renewal of the inoculum, from excessive rubbing, and often from an extension of the period between inoculation and leaf-rinsing. The use of a 0·1 M borate buffer at pH 8 resulted in the development of more lesions than were obtained with any other diluent, although the leaves sustained severe injury unless they were rinsed within a minute of inoculation. Next in efficiency

came 0·1 M glycylglycine and 0·005 to 0·01 M phosphate (both at pH 7) and water [cf. ibid., 32, pp. 316, 474]. Inocula differing in virus concentration by 20 or 10 per cent. consistently produced significantly different lesion counts when 36 or 72 half leaves were rubbed with each inoculum. When two inocula differing by a known amount in virus concentration were compared, each at two dilutions, the virus content of one in relation to that of the other was regularly estimated with an error rarely exceeding 10 per cent.

HUTTON (E. M.). **Some aspects of virus Y resistance in the Potato (Solanum tuberosum).**—*Aust. J. agric. Res.*, 3, 4, pp. 362–371, 1952.

In studies at the Division of Plant Industry, Canberra, of the processes governing resistance to virus Y in the potato [*R.A.M.*, 32, p. 274] the effect on lesion numbers of preparing inoculum of the virulent strain, Victorian Y [loc. cit.], with (1) M/15 phosphate buffer, (2) 0·2 per cent. sodium sulphite, (3) M/15 phosphate buffer containing 0·2 per cent. sodium sulphite, and (4) water was tested [see preceding abstract]. Significantly more lesions developed on potato hybrid 11–84 than on Katahdin, but treatment (1) produced the highest numbers on both, followed by (2).

When leaves of potato hybrids resistant to Y were inoculated, virus development was restricted and in most instances the virus became inactivated within 14 days. There was no evidence that resistance was due to hypersensitivity. Virus development in the leaves of resistant hybrids appeared to be restricted and finally eliminated by the presence of an inactivating system, which was such that any systemic movement of virus did not lead to a carry-over of infection in the tuber progeny.

Where *Nicotiana glutinosa* was the virus source, the addition of virus X to the Y inoculum markedly reduced the numbers of lesions produced by virus Y in 11–84 plants, though this hybrid gives an immune reaction with virus X. This suggests that the same cell loci are responsible for the attachment of both X and Y; X, being more active biochemically, could become attached to most of the loci first, so reducing the attachment points for Y. *Datura stramonium* sap, whether containing virus X or not, strongly inactivated Y.

Cross-bred progenies were developed from two of the resistant hybrids and Katahdin. One progeny contained 68·3 per cent. and the other 29·4 per cent. phenotypes resistant to Y. In both, resistance to Y was closely associated with the immune reaction to X. Immunity from and high resistance to Y appear to be governed by the nulliplex and simplex conditions of a major gene, the quadruplex condition controlling susceptibility [cf. ibid., 32, p. 499].

It is concluded that extreme cell susceptibility is unlikely to be the cause of virus resistance in the potato. Where virus resistance occurs in plants, it is probable that inactivating systems with an enzymatic basis are usually involved [loc. cit.]. The indication of a linkage between the genes and inactivating systems for resistance to Y and X is complementary to the results obtained from the combined inoculation of 11–84 with both viruses. In some of the seedlings the same genes probably govern both Y and X resistance.

MURAYAMA (D.), YAMADA (M.), & MATSUMIYA (H.). **Immunological studies on the Potato virus diseases. III. The distribution and concentration of X virus in the Potato plants affected with crinkle mosaic disease.**—*Mem. Fac. Agric. Hokkaido Univ.*, 1, 3, pp. 227–239, 1 fig., 1953. [Japanese, with English summary.]

Serological methods and the precipitin reaction were used at Hokkaido University, Japan, in 1950–1 to study the distribution and concentration of X virus [*R.A.M.*, 31, p. 203] in potato plants affected by crinkle mosaic caused by viruses X and Y [ibid., 32, p. 335 and preceding abstract]. Virus X was found in all parts

of the flower, concentration being highest in the sepals and lowest (sometimes not detectable) in the ovaries. In Irish Cobbler and Benimaru plants there were no differences in the distribution and concentration of the virus in the floral organs or in the vegetative parts. The virus was present in all vegetative parts of field plants; concentration was highest in the leaves, but as the plants aged it became greatly reduced, and in many instances no virus could be detected in the basal leaves or stems.

In greenhouse plants concentration was highest in the leaves and lowest in the roots, and was generally higher than in field plants. But in Irish Cobbler, Benimaru, and Norin No. 1 no differences in the distribution and concentration of X virus could be detected when the plants were grown under uniform conditions in the greenhouse. There were more Norin No. 1 plants free from X than of the other varieties. In sprouts from diseased tubers the concentration of the virus was remarkably high.

Toxopeus (H. J.). **On the significance of multiplex parental material in breeding for resistance to some diseases in the Potato.**—*Euphytica*, 2, 2, pp. 139–146, 1953.

Nine important contributions to the literature on breeding for resistance to potato diseases form the basis of an up-to-date survey of progress in this field.

Ganguly (A.) & Paul (D. K.). **Wart disease of Potatoes in India.**—*Sci. & Cult.*, 18, 12, pp. 605–606, 2 figs., 1953.

In April, 1953, potato wart disease (*Synchytrium endobioticum*) [C.M.I. map No. 1] was observed on the variety 'Furore' imported from Denmark and grown on the 'Rungbull Seed Potato Farm' in the Darjeeling district, West Bengal. There are no previous records of this disease in India.

Robinson (D. B.) & Ayers (G. W.). **The control of Verticillium wilt of Potatoes by seed treatment.**—*Canad. J. agric. Sci.* [formerly *Sci. Agric.*], 33, 2, pp. 147–152, 1 graph, 1953.

In studies at the Laboratory of Plant Pathology, Charlottetown, Prince Edward Island, semesan bel substantially controlled *Verticillium* wilt (*V. albo-atrum*) [*R.A.M.*, 19, p. 42; 32, p. 502] in Irish Cobbler potato plants from treated setts and tubers, incidence being reduced from 24·8 to 1·7 per cent. Wilt reduction was followed by yield increases probably due to larger size, rather than greater number, of the tubers.

Thirumalachar (M. J.). **Ozonium wilt disease of Potato.**—*Curr. Sci.*, 20, 9, pp. 244–245, 2 figs., 1951.

Root rot and wilting of potato plants characterized by slight yellowing of the lower leaves followed by sudden loss of turgidity due to a soil fungus was observed for the first time at the Central Potato Research Institute, Patna, during the crop season of 1949–50 and again in 1950–1. About 1 per cent. of the plants in fields of Phulwa potatoes at Patna and 3 per cent. of the Majestic crop at Bhowali were also affected. A delicate network of fanwise-branching rhizomorphs killed the roots and stolons and gradually girdled the stem at the collar. The smooth, ovate to spherical, orange-buff to brown sclerotia measured 1 to 3 mm. in diameter in nature and more in culture. Darjeeling Red Round potato plants inoculated with cultures of the fungus wilted within 20 days. As the organism closely resembles *Ozonium texanum*, saprophytic on dead cotton stalks and roots in Texas [*R.A.M.*, 13, p. 634], the name *O. t.* var. *parasiticum* n. var. is proposed.

Woodcock (E. F.). **The correlation between the number of lenticels on Potato tubers and the susceptibility to the Potato-scab organism (Streptomyces scabies (Thaxt.) Waksman and Henrici).**—*Pap. Mich. Acad. Sci.*, 38 (*1952*), Part I, pp. 109–111, 2 diags., 1953.

Counts of lenticels on the tubers of six potato varieties at Michigan State College, East Lansing, demonstrated that although the scab organism (*Streptomyces* [*Actinomyces*] *scabies*) is believed to enter through the lenticels, there is no correlation between the number present on a tuber and its susceptibility to scab.

Noble (Mary) & Marshall (Muriel). **A note on black leg of Potato.**—*Plant Path.*, 1, 4, p. 134, 1952.

Using the methods of Burkholder and Smith [*R.A.M.*, 29, p. 276] in the summer of 1951 at the Seed Testing, Plant Registration and Plant Pathology Station, East Craigs, Edinburgh, the authors obtained 15 similar bacterial isolates from three collections of potato stems and two of tubers affected by black leg. One typical isolate reacted as *Erwinia atroseptica* [loc. cit.; cf. ibid., 32, p. 448], this being confirmed by Professor Burkholder.

The pathogenicity of the isolates was tested by wound inoculating at soil-level plants 1½ to 2 feet high growing in a shaded glasshouse at 15° to 16° C. [cf. loc. cit.]. The soil was drawn up to cover the wound but no bell jars were used. Under these conditions only the black leg organism induced typical symptoms, with rotting of the stems in seven days. Less virulent strains were able to attack the succulent tissues near the top of the plant.

Stapp (C.). **Fortgeführte Untersuchungen über die Widerstandsfähigkeit deutscher Kartoffelsorten gegen den bakteriellen Erreger der Schwarzbeinigkeit und Knollennassfäule.** [Further investigations on the resistance of German Potato varieties to the bacterial agent of black leg and tuber wet rot.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 3, 12, pp. 185–187, 1951.

Of the 22 German potato varieties tested in 1949–50 for reaction to *Bacterium phytophthorum* [a strain of *Erwinia carotovora*: see above, p. 613] Biene, Immertreu, and Toni were resistant and Heida, Maritta, Heimkehr (Mazurka), Panther, Pommernbote, and Ronda fairly so.

MacLachlan (D. S.), Monro (H. A. U.), Racicot (H. N.), & King (J. E.). **Fumigation of used bags with toxic gases for the control of bacterial ring rot of Potato.**—*Canad. J. agric. Sci.* [formerly *Sci. Agric.*], 33, 2, pp. 132–140, 1953.

In further tests of gases at the Department of Agriculture, Ottawa, for the control of potato ring rot (*Corynebacterium sepedonicum*) in used jute bags [*R.A.M.*, 31, p. 512] ethylene oxide was toxic at 100 mg. per l. after 16 hours' exposure and at 150 mg. after eight and 16 hours. In another test with carboxide (10 per cent. ethylene oxide and 90 per cent. carbon dioxide) on contaminated jute squares in bales ethylene oxide at a dosage of 80 mg. per l. (5 lb. per 100 cu. ft.) was toxic to the organism in 250-bag bales after 16 and 24 hours' exposure at atmospheric pressure, and after three hours under partial vacuum, the figures for 500-bag bales being 24 hours at atmospheric pressure and five and 16 hours under partial vacuum.

Silva (M. V. E.). **Directrizes para o melhoramento do Arroz.** [Recommendations for the improvement of Rice.]—75 pp., 11 figs., Ministério da Economia, Comissão Reguladora do Comércio de Arroz, Lisbon, 1952. [English summary.]

This booklet contains a brief section (pp. 13–15) on the breeding of rice for resistance to disease in Portugal, where the most important fungal pathogen is

Piricularia oryzae [*R.A.M.*, 32, p. 512]. Scarcely known in the country until a short time ago, its ravages appear to be increasing year by year in the districts of Mondego and Sado, raising a problem that urgently requires investigation.

Otani (Y.). **Studies on the relation between the principal components of Rice plant and its susceptibility to the blast disease (2).**—*Mem. Fac. Agric. Hokkaido Univ.*, 1, 3, pp. 375–380, 1953. [Japanese, with English summary.]

Further studies in Japan on rice blast [*Piricularia oryzae*: *R.A.M.*, 32, pp. 276, 505] demonstrated that rice seedlings raised in the hot-bed nursery are much more severely affected and bear more numerous, larger spots than plants raised in an ordinary nursery. Hot-bed seedlings contain much more soluble protein nitrogen, α-amino nitrogen, and basic nitrogen than other seedlings. Rice plants may be seriously attacked at ear formation and the boot stage, when the leaves contain more soluble organic nitrogen than at other stages. It would appear that the amount of soluble organic nitrogen affects the size of the lesions.

Dobbs (C. G.) & Hinson (W. H.). **A widespread fungistasis in soils.**—*Nature, Lond.*, 172, 4370, pp. 197–199, 1953.

In studies at the University College of North Wales, Bangor, two sterile microscope slides held together by rubber bands and in contact at one end but separated by a glass fibre 0·7 mm. thick at the other, were used to detect fungi in soils. When inserted in the faces of pits in forest soils it was found that after 14 days numerous mycelia had spread from the edge on the two protected surfaces. Isolations from these traps yielded a range of 'sugar fungi' [*R.A.M.*, 30, p. 626], mainly *Penicillium* spp. and Mucorales. It was clear that these had developed from spores germinating in condensed moisture between the slides. In order to determine why such spores had not germinated previously in the soil, cellulose film about 20 μ thick, boiled to remove the surface dressing and autoclaved, was cut into 2-in. squares, folded while still damp with the test spores inside, partially buried in moist soil, and pressed firmly against it. In every test so far spore germination has been completely inhibited on the area of film with which the soil was in close contact. No such inhibition occurred on the 'margins' of the film not in close contact with the soil, or on parts pressed between soaked filter papers, or certain minerals of similar wetness, or autoclaved soil. In fact the last-named stimulated germination as compared with the 'margins'. When the 'folds' from living and autoclaved soils were exchanged after a few days germination proceeded on the former, while hyphal growth on the latter was checked. Inhibition did not occur when film about 120 μ thick was used. So far the above test has been applied to soils from 15 sites in North Wales and one in Warwickshire, and to subsoils from several sites. Complete inhibition occurred in every sample of fresh soil tested but not in three old dried soils bottled for periods of up to 20 years. A random spore mixture from colonies on a soil plate was completely inhibited by the soil from which they were cultured.

The results of these studies indicate the presence of a widespread fungistatic factor which, judging by its distribution in depth, may co-exist with an organic soil constituent. It appears to be masked, rather than destroyed, by the presence of even a trace of glucose or of nutrients liberated from killed micro-organisms. It is not restored rapidly following severe heating or prolonged desiccation.

Saitô (T.). **The soil fungi of a salt marsh and its neighbourhood.**—*Ecol. Rev.*, 13, 2, pp. 111–119, 1952. [Japanese summary. Received August, 1953.]

In this study of the fungus flora of a salt marsh and neighbouring localities on the shore of a lagoon on the Pacific coast of Fukushima Prefecture, Japan, acid glucose-peptone, Czapek's, and Cook's second were the agar media employed. *Penicillium oxalicum* and *Trichoderma lignorum* [*T. viride*] were dominant. Species of *Fusarium*

and *Mucor* (*M. hiemalis* and *M. racemosus*) were widespread, while *Aspergillus* and other common species were detected rarely.

The smallest number of moulds was found in the sand dune (40 to 240 per gm. dry soil) and by far the largest in the humus soil of a former *Pinus thunbergii* pine-wood (up to 690,000 per gm.). Excessive dryness or wetness, lack of organic matter, or excess of salt all limited the numbers of fungi.

The growth of *Penicillium oxalicum* and *T. viride* was lessened by the addition of 1 per cent. sodium chloride to Czapek's solution, while the germination of spores was delayed by the addition of 3 per cent. and 2 per cent. salt, respectively, The salt content of the soil water of the salt marsh was estimated to be 1·7 per cent.

Nelson (R.). **Mint rust and its control.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 34, 4, pp. 436–455, 4 figs., 1952.

Mint rust (*Puccinia menthae*) [*R.A.M.*, 31, p. 351] was observed for the first time on peppermint (*Mentha piperita*) in commercial plots in Michigan in 1951, causing great oil yield losses in many localities and complete defoliation and death of the entire top growth in some of the nursery accessions at East Lansing. The American clone of *M. piperita* is apparently more resistant than the English (or Mitcham) ones. Observations made since 1944 on the development of rust in the collection of mints grown at Mentha and later transferred to East Lansing have shown that susceptible clones are usually more severely attacked in the nursery than in commercial plantings. In 1951 the host range was greatly extended. Free from rust in that year were *M. spicata* and *M. crispa* from the Royal Botanic Gardens, Kew, *M. rotundifolia*, *M. sylvestris* and its var. *canadensis*, *M. rubra*, *M. pulegium*, *M. niliaca*, and several unidentified *M.* spp.

In resistance trials of 3,500 hybrids between *M. spicata* (American and Scotch spearmint) and *M. crispa*, some 2,630 proved resistant and so did several thousand seedlings from crosses between *M. piperita* and *M. crispa*. Hybrids between Scotch spearmint and *M. crispa* appear to be resistant to all races of the rust occurring in Michigan. In dusting experiments in 1948 and 1950 10 per cent. fermate dust was the most effective but cannot be recommended on account of the carbon disulphide (up to 500 p.p.m.) found in the oils from dusted plants. Satisfactory control was obtained with cuprocide-sulphur dust (6–10), 2 per cent. actidione, and tribasic copper plus zinc (14 lb.+4 lb. to 100 lb. dust). The last-mentioned, if applied in dust form thoroughly and in time, would probably prevent rust infection.

Landrau (P.) & Adsuar (J.). **Effect of chlorotic streak on the yield of Sugarcane.**—*J. Agric. Univ. P.R.*, 37, 1, pp. 19–27, 2 figs., 1953. [Spanish summary.]

Sugar-cane chlorotic streak is largely confined to the more humid areas of Puerto Rico [cf. *R.A.M.*, 32, p. 510]. P.O.J. 2878, which comprises about 65 per cent. of the cane grown in the Island, the Barbados varieties 34–104 and 37–161, P.R. 902 and 905, and M. 336 are all highly susceptible under certain climatic conditions.

In a field experiment carried out at Río Piedras from 1949 to 1952 it was found that cane grown from non-infected seed pieces produced significantly higher yields (average of 42 tons per acre) than that grown from infected stock (34 tons). Immersion in hot water (52° C. for 20 mins.) [loc. cit.] significantly reduced streak incidence and increased both cane and sugar yields by about 30 per cent., but an increase of about 45 per cent. in sugar production resulted from planting non-infected seed pieces. Therefore the proper selection of good setts free from chlorotic streak will give higher cane yields without the expense entailed by treatment.

González Ríos (P.) & Adsuar (J.). **Effect of mosaic on the yield of Sugarcane variety B. 34–104.**—*J. Agric. Univ. P.R.*, 37, 1, pp. 13–18, 1953. [Spanish summary.]

Many farmers in Puerto Rico believe that the sugar-cane variety B.34–104,

though susceptible to mosaic [*R.A.M.*, 30, p. 123], can produce more sugar than current commercial varieties and that it recovers from the disease. However, preliminary investigations in 1950 and 1951 at the Agricultural Experiment Station, Río Piedras, elicited the following conclusions. Once canes of B.34–104 are infected with the common mosaic prevailing in the island they do not recover and infected setts invariably produce diseased plants. There was a 29 per cent. tonnage reduction in the cane crop and 32 per cent. in the first ratoon crop attributable to mosaic [cf. ibid., 31, p. 352]. Sugar production of 96° polarization by healthy B.34–104 the first year was 26·7 per cent. higher than that of diseased cane and 41·7 per cent. higher in the second year. Even if B.34–104 were maintained mosaic-free it would produce about the same quantity of sugar as P.O.J. 2878, but a greater tonnage would be required and profits would be lower.

Knust (H. G.). **Notes on the heat treatment of Cane plants at the Bundaberg Sugar Experiment Station.**—*Proc. Qd Soc. Sug. Cane Technol., 1953*, pp. 131–134, 2 figs., 1953.

In an investigation in Queensland of heat treatments against the sugar-cane stunting disease [*R.A.M.*, 31, p. 352] 13 varieties were submitted to hot water (at 52° C. for 1½ hours and at 53° for one hour) or hot air (51·8° to 53° for 13 hours). The influence of the time-temperature factor of the hot-water treatment on ultimate germination varied considerably in different varieties. Some which germinated poorly after one hour at 53° grew much better after two hours at 52°. Canes treated with hot air all showed good root growth and germination, but it is suggested that they should be soaked in a mercurial solution after treatment to restore some of the moisture lost in the process and to control sett-rotting organisms. The need for adequate soil moisture is emphasized.

Whalley (T. G.) & Kent (R. H.). **The deterioration of mercurial fungicide solutions.**—*Proc. Qd Soc. Sug. Cane Technol., 1953*, pp. 17–22, 1 fig., 1953.

During the 1952 planting season a series of analyses was carried out in the Lower Burdekin area, Queensland, to determine the factors responsible for the deterioration of aretan solutions used for sugar-cane setts against *Ceratostomella paradoxa* [*R.A.M.*, 32, p. 591]. Some weeks after dipping there was no mercury in the supernatant liquid but it was present in the sludge. Deterioration was more rapid for the second and third batches dipped than for the first. Poor germination followed the use of aretan at low concentrations. It is recommended that the floors of the dipping tanks should be washed completely free of all sediment before fresh solutions are made up, that detachable boxes should be placed on planks when being filled to avoid carrying soil into the dipping tank, sawdust should be kept out of the solution, and double strength (1 per cent.) aretan used to make up the volume absorbed on cane setts. It is best to discard dips as soon as active fermentation accompanied by blackening of the solution takes place.

Critopoulos (P. D.). **A contribution to the fungus flora of Greece.**—*Bull. Torrey bot. Cl.*, 80, 4, pp. 325–341, 6 figs., 1953.

This annotated list of 100 fungi collected in Greece [cf. *R.A.M.*, 31, p. 256] includes the following new records for the country: *Uromyces pisi* on *Lathyrus pratensis*, *Puccinia helianthi* on sunflower [C.M.I. map No. 195], *Sphacelotheca sorghi* on *Sorghum* sp. [ibid., No. 220], *Septoria apii-graveolentis* on celery, *S. nodorum* on wheat, *Alternaria cichorii* on chicory, and *A. raphani* on *Brassica oleracea* var. *capitata*. New host records include *Gymnosporangium clavariiforme* on *Crataegus heldreichii*, *Cydonia oblonga*, and *Juniperus oxycedrus*; *Puccinia coronata* on *Avena barbata*; *P. graminis* on *A. barbata*, *Hordeum bulbosum*, and *Lolium rigidum* var.

compressum; *P. menthae* [ibid., No. 211] on *Calamintha incana* and *Clinopodium vulgare*; *P. triticina* on *Aegilops caudata* and *A. crassa*; and *Ustilago avenae* [ibid., No. 238] on *Avena byzantina*.

Jørstad (I.). **Parasitic fungi from various parts.**—*Nytt mag. Bot.*, 1, pp. 89–106, 2 figs., 1953.

A collection of parasitic fungi (now in the University Botanical Museum, Oslo) made in Cyprus by Prof. J. Holmboe in 1905 was recently found to contain the new records *Uromyces betae* on beet [C.M.I. map No. 265] and *Tuburcinia* [*Urocystis*] *violae* on *Viola* sp. The other specimens (21) in the collection are listed. Notes are also given on 22 specimens from Kamchatka, U.S.S.R., collected by E. Hulteń in 1920–22, including *Gymnosporangium clavariiforme* on *Crataegus chlorosarca*, a new host, and some fungi from South Alaska and the Aleutian Islands, about half of which were collected by E. Hulteń in 1932 (both collections being deposited in the State Museum, Stockholm).

Săvulescu (T.). **Materiale pentru flora Uredineelor din România. Suppliment II.** [Materials for the rust flora of Rumania. Supplement II.]—*Anal. Acad. române*, Ser. A, 1, pp. 1–36, 1949. [Russian and French summaries.]

In this second supplement to the Uredinales of Rumania [cf. *R.A.M.*, 32, p. 280], now constituting 380 species on 779 hosts, 144 species occurring in different parts of the country, particularly in Alba and Hunedoara districts, are listed with annotations. Included among the 10 species, subspecies, and varieties new to the country is *Uromyces trifolii* on clover. Among the 52 new hosts mentioned are *Cytisus albus*, *C. elongatus*, and *Genista sagittalis*, all affected by *U. genistae-tinctoriae* [cf. ibid., 27, p. 387], and *Paeonia officinalis* affected by *Cronartium flaccidum* [cf. ibid., 27, p. 386]. *Puccinia sorghi* was observed on maize [cf. ibid., 32, p. 250].

Brien (R. M.) & Dingley (Joan M.). **A revised list of plant diseases recorded in New Zealand.**—*N.Z. Bull. Dep. sci. industr. Res.* 101, 62 pp., 1951. [Received 1952.]

This is a revision of the original New Zealand list published in 1939 [*R.A.M.*, 18, p. 726] and covers some 533 diseases of fungal, bacterial, virus, and physiological origin on 567 host plants. Included also are diseases contained in the two supplements (1942 and 1946) [ibid., 26, p. 330] and those identified since 1946.

Shen (S. C.) & Siang (W. N.). **Studies in the aquatic phycomycetes of China.**—*Sci. Rep. nat. Tsing Hua Univ.*, Ser. B, 3, 3, pp. 179–206, 13 figs., 1948. [Received December, 1952.]

Descriptions are given of 45 species of aquatic phycomycetes [cf. *R.A.M.*, 21, p. 45], of which two are new and 32 are new records for China. *Rozella irregularis* was parasitic on *Pythium* sp. and *Olpidiopsis saprolegniae* on vegetative hyphae of *Saprolegnia ferax*. *S. ferax* infected young fish at the Institute of Zoology, National Academy of Peiping. *Achlya flagellata* caused a serious disease of fish at the Zoology Laboratory, National Peiping University, and was also parasitic on germinating rice grains [cf. ibid., 30, p. 620].

Rogerson (C. T.) & Muenscher (W. C.). **The vegetation of Bergen Swamp. VI The fungi.**—*Proc. Rochester Acad. Sci.*, 9, 4, pp. 277–314, 1950. [Received 1953.]

This list of the fungi found in Bergen Swamp, Genesee county, New York, mostly between 1944 and 1949, comprises 600 species in 248 genera and a host index.

Canter (Hilda M.) & Lund (J. W. G.). **Studies on plankton parasites. II. The parasitism of diatoms with special reference to lakes in the English Lake District.** —*Trans. Brit. mycol. Soc.*, 36, 1, pp. 13–37, 5 figs., 1 graph, 1953.

The present study in this series [cf. *R.A.M.*, 30, p. 583] is a survey of the seasonal incidence of fungal infection (mostly Chytridiales) of plankton diatoms in the English Lake District, together with observations on samples received from Europe and New Zealand.

Yuill (E.). **A new ascosporic species of Aspergillus.**—*Trans. Brit. mycol. Soc.*, 36, 1, pp. 57–60, 1 pl., 3 figs., 1953.

A new species of *Aspergillus*, designated *A. quadricinctus* on account of the characteristic four membranous bands or girdles around the ascospores, was isolated at York in 1945 from cardboard made from salvage material.

Best (R. J.) & Gallus (H. P. C.). **Some effects of mosaic virus on nitrogen and phosphorus metabolism in Tobacco plants.**—*Nature, Lond.*, 172, 4373, p. 347, 1953.

In experiments at the Waite Agricultural Research Institute, University of Adelaide, South Australia, 50 tobacco plants at the eight-leaf stage were infected artificially with Johnson's No. 1 strain of tobacco mosaic virus [*R.A.M.*, 28, p. 423; 31, p. 211]. The concentrations of protein nitrogen [cf. ibid., 32, p. 218] and protein phosphorus (expressed as gm. per 100 gm. dry matter) were higher in leaves of infected plants than in the healthy controls throughout the 40-day growing period allotted. In healthy plants phosphorus decreased by 40 per cent. during the period of observation whereas it remained constant in infected plants. The virus formed an increasingly large proportion of the total protein of older leaves as infection proceeded but constituted a roughly constant proportion of the protein of younger leaves. The calculated weight of virus present (from the difference in the nitrogen-phosphorus ratio between healthy and diseased plants) was mostly higher than the values obtained by the infectivity method. In young leaves only about one-quarter of the calculated 'total virus' was infective but in older leaves the proportion was higher, decreasing with the duration of infection.

In further experiments with nitrogen at a level which limited growth the amount of infective virus per plant was greater by a factor of 12 at the first harvest and 8 at the last than in those receiving adequate nitrogen. It appears, therefore, that when nitrogen is a limiting factor, the production of normal plant proteins is affected less than the production of virus.

Akune (S.) & Koga (K.). **Studies on potassium content of virus-diseased Tobacco plants cultivated by different quantities of potassium.**—*Bull. Fac. Agric. Kagoshima Univ.* 1, pp. 4–9, 1952. [Japanese, with English summary. Received May, 1953.]

The potassium content of tobacco leaves (but not the stems) inoculated with common tobacco mosaic virus was less than that of healthy leaves of plants given normal and high potassium in the form of potassium sulphate, but was greater in the low potassium plot. The respiration index of inoculated plants was higher in the normal and high potassium plots but less in the low. Catalase activity [*R.A.M.*, 32, p. 551] followed the same trend in the first week but in the next three weeks was less in all inoculated plants.

Gondo (M.). **Respiration of virus diseased Tobacco plant (I).**—*Bull. Fac. Agric. Kagoshima Univ.* 1, pp. 1–3, 1 diag., 1952. [Japanese, with English summary. Received May, 1953.]

The respiration ratio of a complete, growing, healthy tobacco plant was compared

with that of one infected with cucumber mosaic virus [cf. *R.A.M.*, 21, p. 392]. The former was higher than the latter, though the ratio for young, severely diseased plants was greater than that of the healthy mature ones.

Newhook (F. J.) & Davison (R. M.). **Combined hormone-fungicide sprays for control of Botrytis fruit-rot in glasshouse Tomatoes.**—*Nature, Lond.*, 172, 4373, p. 351, 1953.

A high degree of protection against tomato fruit rot caused by *Botrytis cinerea* following hormone treatment for fruit set [*R.A.M.*, 28, p. 37; 31, p. 635] was obtained at the Fruit Research Station, Department of Scientific and Industrial Research, Auckland, New Zealand, by incorporating a fungicide in the hormone (50 p.p.m. β-naphthoxyacetic acid) sprayed on the trusses at full bloom, followed by the fungicide alone, 10 to 14 days later. In one trial 0·5 per cent. 'fermspray' [ferbam: cf. ibid., 32, p. 555] and 0·15 per cent. phygon XL reduced fruit rot by 73 and 53 per cent., respectively. Neither treatment affected yield or fruit quality adversely and residues were negligible. Further trials are in progress.

Best (R. J.) & Gallus (H. P. C.). **Preservation of the virus of Tomato spotted wilt in dried plant material.**—*Nature, Lond.*, 172, 4373, p. 315, 1953.

In experiments at the Waite Agricultural Research Institute, South Australia, transferring freshly harvested tomato plant material infected with spotted wilt virus [*R.A.M.*, 18, p. 556] to a 'deep freeze' at —20° C. was only partially successful in preserving the virus: strain A survived for 32 days but not 74 and strain E for 36 but not 78. The most successful method tried so far is to freeze-dry the tissue first and then store it at —20°. Strains A (in tomato leaflets) and E (in *Nicotiana glutinosa*) infected test plants after 125 days' storage but there is some evidence that the mild strain E is not holding out as well as A. Further results are awaited.

Raychaudhuri (S. P.). **Reproduction of symptoms resembling internal browning of Tomato under greenhouse conditions.**—*Plant Dis. Reptr*, 37, 4, pp. 220-221, 1 fig., 1953. [Multilithed.]

In studies at the Rockefeller Institute for Medical Research, New York, to determine the cause of internal browning of tomatoes [*R.A.M.*, 32, p. 518], Bonny Best plants infected with a strain of tobacco mosaic virus [loc. cit.] were grown in a greenhouse at 20° to 25° C. and given three different treatments. Ten plants received additional doses of nitrate (sodium nitrate, 0·2 per cent. in 200 ml. water) twice a week, the fruits when 1½ to 2 in. in diameter being dipped in water for four to five days. Of these, two plants developed symptoms resembling internal browning. No bacteria or fungi could be isolated from the discoloured tissues. Virus-free plants given similar treatment also developed characteristic necrotic lesions.

These observations, though only preliminary, indicate that a high air moisture content causing water congestion of the tomato fruit tissue may be an important factor in internal breakdown. The role of the virus remains uncertain.

Tamir (P.). **A better dressing for the treatment of pruning wounds.**—*Plant Dis. Reptr*, 37, 4, p. 259, 1953. [Multilithed.]

Sheged, a dressing for tree-pruning wounds [cf. *R.A.M.*, 32, p. 566] which has been used successfully for several years in Israel, is prepared from 1 lb. each of beeswax, motor oil (such as 'Shell 20'), and commercial lime powder. The results of preliminary experiments indicate that the addition of 2,4-D or zinc oxide may accelerate the healing process, inducing a bacterial and fungicidal effect at the same time.

Carter (J. C.) & Hoffman (P. F.). **Results of fungicide tests for control of leaf diseases of Black Walnut, Catalpa, and American Elm in 1951 and 1952.**—*Plant Dis. Reptr*, 37, 2, pp. 114–115, 1953. [Multilithed.]

Fungicide trials were carried out in Illinois in 1951 for the control of the leaf spot diseases of black walnut [*Juglans nigra*] and *Catalpa*, caused by *Marssonina juglandis* [*Gnomonia leptostyla*: *R.A.M.*, 28, p. 94] and *Alternaria catalpae*, respectively, and in 1952 against black leaf spot of American elm [*Ulmus americana*] (*G. ulmea*) [ibid., 30, p. 252]. Puratized agricultural spray (1 pt. in 100 gals.) was most effective on walnut, resulting in an average of 1·1 spots per leaflet compared with 20·3 for the untreated; experimental fungicides 640 (2 lb., Carbide and Carbon Chemical Co.) and 466-C (3 oz., Mathieson Chemical Co.) on *Catalpa* allowed 16·1 and 17·6 spots per leaf, respectively, compared with 48·3 for the unsprayed; with tag 331 (½ pt.) on elm there was no leaf spot as against 45·2 per cent. leaf surface infected for the untreated. Phygon (1 lb.), puratized agricultural spray, vancide 51 (2 lb.) plus a sticker, and parzate (2 lb.) came next in order of effectiveness against elm leaf spot with 6·1, 6·6, 7·7, and 9·4 per cent. infection, respectively; tag 331 and puratized agricultural spray, however, caused a little browning of the foliage.

Hoffman (P. F.). **Results of fungicide tests for control of Sycamore anthracnose in 1952.**—*Plant Dis. Reptr*, 37, 2, pp. 112–113, 1953. [Multilithed.]

Of the ten fungicides tested for the control of sycamore (*Platanus occidentalis*) anthracnose (*Gnomonia veneta*) [*G. platani*: *R.A.M.*, 32, p. 109] in Illinois, puratized agricultural spray (1 pt. in 100 gals.) and tag 331 (½ pt.) were the most effective, the percentages of infected leaves being 6 and 9, respectively, as against 33 for the untreated. Defoliation of treated trees was negligible. Of the three applications given, that at the broken bud stage was most significant in controlling the disease.

Nienstaedt (H.). **Tannin as a factor in the resistance of Chestnut, Castanea spp., to the Chestnut blight fungus, Endothia parasitica.**—*Phytopathology*, 43, 1, pp. 32–38, 1 fig., 1953.

At the Connecticut Agricultural Experiment Station the function of tannins in the resistance of chestnut trees to blight (*Endothia parasitica*) was investigated in the light of observations by Cook and Wilson (*Bull. N.J. agric. exp. Sta.* 291, 1916) and Graves [*R.A.M.*, 6, p. 135] as to the adverse effects of these substances on the pathogen. Pulverized bark of *Castanea dentata*, *C. crenata*, and *C. mollissima* was extracted with water, alcohol, and ether. The results of assays of the extracts with *E. parasitica* denoted that the bark of the more resistant *C. crenata* and *C. mollissima* contains antibiotic materials in sufficiently high concentrations to retard the growth of the fungus. In tests with purified bark tannins, those of *C. mollissima* were much the most toxic, causing abnormal growth of the fungus at a concentration of 0·4 per cent. and entirely inhibiting its development over a seven-day period at 1·2 per cent.; after 11 days the average diameter of the cultures was only 10·33 mm. Retardation by the extracts from the other two species was apparent only at 1·2 per cent.

The total concentration of the tannins in the bark of the three species was not correlated with their relative resistance to blight, but the amounts were larger in aqueous extracts from the resistant than from the susceptible species. The tannin in *C. mollissima* is probably a pyrogallol tannin and that of the other two species a mixture of catechol and pyrogallol tannin. The disparities in resistance of the three species are thought to be due, at least in part, to the differential solubility and qualitative differences of their tannin contents.

Ernst (R. A.) & Bretz (T. W.). **American Chestnut susceptible to Oak wilt fungus.**—*Plant Dis. Reptr*, 37, 3, p. 163, 1953. [Multilithed.]

In greenhouse inoculation experiments carried out by the Division of Forest Pathology, United States Department of Agriculture, in co-operation with the Missouri Agricultural Experiment Station, six of the eight two-year-old American chestnut (*Castanea dentata*) seedlings inoculated by hypodermic injection with a mixed spore suspension of a number of isolates of *Endoconidiophora fagacearum* [or *Chalara quercina*: cf. *R.A.M.*, 31, p. 357] developed typical wilt symptoms in 44 to 81 days. The fungus was reisolated, one culture developing fertile perithecia on chestnut agar, indicating a mixture of compatible strains [see above, p. 596]. Only one of a number of trees grown out-of-doors under nursery conditions and inoculated in mid-July and mid-September became infected.

Bretz (T. W.) & Morison (D. W.). **Effect of time and temperature on isolation of the Oak wilt fungus from infected twig samples.**—*Plant Dis. Reptr*, 37, 3, pp. 162–163, 1953. [Multilithed.]

Preliminary studies were made by the Division of Forest Pathology in co-operation with the Missouri Agricultural Experiment Station, Columbia, to determine the factors affecting the survival of *Endoconidiophora fagacearum* [or *Chalara quercina*: see preceding and next abstracts] in small-diameter (up to $\frac{3}{4}$ in.) oak twigs. Difficulty had been experienced in obtaining cultures from similar specimens collected from diseased trees. The results indicated that time and temperature are the critical factors in handling the samples. At 20° to 25° C. and above the survival of the fungus was relatively short and the development of secondary organisms in culture increased with the lengthening of the time interval between collection and isolation; wrapping the samples increased surface contamination. The pathogen was isolated from samples kept at 0° to 10° for up to 27 days and from twigs stored in a deep-freeze unit for three months.

Campbell (R. N.) & French (D. W.). **Mycelial mats of Oak wilt found in Minnesota during dry weather.**—*Plant Dis. Reptr*, 37, 4, p. 243, 1953. [Multilithed.]

Mycelial mats of *Endoconidiophora fagacearum* [*Chalara quercina*: see above, p. 597, and preceding and next abstracts] were found in all stages of development on dead red oak [*Quercus* spp.] trees in Minnesota after a two and a half months' drought in 1952. It appears that there is enough moisture under the bark of standing dead trees to permit fungus development in very dry weather, forming a reservoir of inoculum by which the disease can be transmitted even after the growing season is over.

Young (H. C.), Bart (G. J.), Spilker (O.), Brandt (W. H.), & Redett (R. B.). **Progress of Oak wilt investigations in Ohio.**—*Plant Dis. Reptr*, 37, 4, pp. 244–245, 1953. [Multilithed.]

In researches on oak wilt (*Chalara* [*quercina*: see preceding abstracts]) conducted in 1952 at the Ohio Agricultural Experiment Station, Wooster, the fungus was isolated from roots up to 6 to 8 ft. away from the stumps of felled oak trees, but not from the lumber or sawdust, or, four weeks after cutting, from any of the above-ground parts of the trees. Some wood-rotting fungi isolated from wilted oaks, particularly *Xylaria multiplex*, completely prevented the growth of *C. quercina* on agar plates.

Wiehe (P. O.). **Bibliography of the fungi and bacteria associated with Tung (Aleurites spp.).**—*Plant Dis. Reptr, Suppl.* 216, pp. 189–199, 1952. [Multilithed.]

The author has compiled from the literature a list of fungi (90 species) and one

bacterium [*R.A.M.*, 30, p. 551; 32, pp. 287, 349, 524] arranged in the alphabetical order of Latin binomials. In two appendices are listed the fungi under the parts of the plant attacked and the geographical distribution, respectively.

Zycha (H.). **Die Phomopsis-Krankheit an Douglasie und Japanlärche.** [The *Phomopsis* disease of Douglas Fir and Japanese Larch.]—*Flugbl. biol. Bundesanst. Braunschw.* M 15, 6 pp., 5 figs., 1953.

This is an abridged, semi-popular version of the author's studies on the disease of Douglas fir (*Pseudotsuga taxifolia*) and Japanese larch (*Larix leptolepis*) caused by *Phomopsis pseudotsugae* in western Germany, a notice of which has already appeared from another source [*R.A.M.*, 32, p. 157].

Fowler (M. E.) & Aldrich (K. F.). **Resurvey for European Larch canker in the United States.**—*Plant Dis. Reptr*, 37, 3, pp. 160–161, 1953. [Multilithed.]

A survey for larch canker (*Dasyscypha willkommii*) [*R.A.M.*, 30, p. 143] was begun in the United States in 1952 following a 14-year period in which no surveys had been made. Only three newly infected European larch (*Larix decidua*) trees were detected among thousands inspected in the Massachusetts area, indicating the success of previous attempts to arrest the spread of the disease. The infected trees were destroyed immediately. It is believed that the disease will be prevented from spreading to planted and native larch stands.

Hawksworth (F. G.). **The pycnial stage of Cronartium filamentosum.**—*Plant Dis. Reptr*, 37, 4, p. 246, 1953. [Multilithed.]

The pycnia of *Cronartium filamentosum* were observed for the first time in nature on *Pinus ponderosa* var. *scopulorum* [*R.A.M.*, 32, p. 408] of all ages in the Grand Canyon National Park and in the Forest Valley Experimental Forest, Flagstaff, Arizona, and in Bryce Canyon National Park, Utah, in 1952. The amber-coloured pycnial drops were mostly distal to the current year's aecia and sometimes 10 in. or more beyond them. The hyaline, spherical pycniospores measured 1·5 to 2 μ in diameter and the slender pycniophores 30 to 40 by about 1·5 μ.

Welch (D. S.) & Stone (E. L.). **Fomes annosus (Fr.) Cke in coniferous plantations in New York State.**—*Plant Dis. Reptr*, 37, 4, pp. 247–248, 1 fig., 1953. [Multilithed.]

Fomes annosus was isolated from the roots of pine trees (*Pinus resinosa*) [*R.A.M.*, 30, p. 639; cf. 32, p. 109] in a 34-year-old plantation on an acid soil near Ithaca and in a 29-year-old one on similar soil near Golden's Bridge, New York.

White (L. T.). **Studies in forest pathology. X. Decay of White Pine in the Timagami Lake and Ottawa Valley areas.**—*Canad. J. Bot.*, 31, 2, pp. 175–200, 2 pl., 11 graphs, 1 map, 1953.

In a further contribution to this series [cf. *R.A.M.*, 32, p. 348] information essential to the management of even-aged stands of white pine (*Pinus strobus*) was secured by a study of its decay in Ontario. Of 1,012 trees in ten 1-acre plots 52 per cent. were decayed. There was a well-defined relationship between age and decay, the proportion of trees affected increasing gradually from 40 per cent. in the 60-year age group to 100 per cent. in the 220-year group, the corresponding loss in merchantable volume rising from 4 to 40 per cent. Decay incidence was similar in vigorous and non-vigorous trees but the volume percentage lost was considerably greater in the latter. The pathological rotation as indicated by the maximum periodic increment, occurs in the 160- to 170-year group. Several methods of estimating the volume of decay in logs are compared and regression lines, defining the percentage of cull allowances at all ages, are presented. Thirteen wood-destroying

fungi are associated with the decay of living white pine in Ontario, notably *Fomes pini* [ibid., 32, p. 520], responsible for 90 per cent. of all trunk and butt losses. *Corticium fusco-atratum* caused 3 per cent. loss while *C. galactinum* accounted for more than 10 per cent. of all the butt rot. External signs of decay were rare, except in cases of advanced white pocket rot caused by *F. pini*.

Bagchee (K.). **A new and noteworthy disease of Gamhar (Gmelina arborea Linn.) due to Poria rhizomorpha sp. nov.**—*Indian For. Rec.*, N.S. Mycol., 1, 3, pp. 25–39, 8 pl., 1953.

This paper on the disease of gamhar (*Gmelina arborea*) in India caused by *Poria rhizomorpha* has already been noticed from another source [*R.A.M.*, 32, p. 291].

Baxter (D. V.). **Some resupinate polypores from the region of the Great Lakes. XXIV.**—*Pap. Mich. Acad. Sci.*, 38 (*1952*), Part I, pp. 115–123, 5 pl., 1953.

Continuing his studies on North American polypores [cf. *R.A.M.*, 32, p. 526], the author describes *Poria weirii* [ibid., 29, p. 188] with particular reference to its geographical distribution, host range, cultural characters, and responses to various environments. In 1951 it was found attacking *Thuja plicata* wood products in south-eastern Alaska [ibid., 31, p. 401]. The optimum temperature for growth on malt agar is 25° C.; there is scarcely any growth at 30°, and none at 35°.

Cartwright (K. St G.) & Findlay (W. P. K.). **Dry rot in wood.**—*Bull. For. Prod. Res. Lond.* 1 (5th Edition), iv+36 pp., 8 pl., 4 diags., 1952. 2*s*.

This handbook on the fungal destruction of the woodwork of buildings in Great Britain [cf. *R.A.M.*, 24, p. 393, and above, p. 599] contains descriptions of the wood-destroying fungi, their detection and control, and preventive treatments.

Harmsen (L.). **Merulius tignicola Harmsen, eine neue Hausschwamm-Art in Dänemark.** [*Merulius tignicola* Harmsen, a new species of house fungus in Denmark.]—*Holz a. Roh- u. Werkst.*, 11, 2, pp. 68–69, 1953.

This is an abridged version of the author's studies on *Merulius tignicola*, an agent of dry rot of wood in Denmark, which have already been noticed from another source [*R.A.M.*, 31, p. 525].

Knodel (H.). **Zur Frage der Unterscheidung der Schwammschäden nach holzzerstörenden Pilzen.** [On the question of the differentiation of fungal damage according to the wood-destroying fungi concerned.]—*Holz a. Roh- u. Werkst.*, 11, 1, pp. 9–10, 1953.

Wood samples from German buildings frequently contain several lignicolous fungi, e.g., *Poria vaillantii*, *P. xantha*, *Coniophora cerebella* [*C. puteana*], and *Lenzites abietina*. It seems unlikely that these species, with totally dissimilar environmental requirements, can all have developed simultaneously in the same place, and others may also have been present at a different stage, especially if changes in temperature, humidity, and the like have occurred. The author discusses the possibility of providing guiding principles for the diagnosis and evaluation of the types of fungal damage associated with the different species, including (besides the above-mentioned) *Merulius lacrymans*, which may necessitate reconditioning of buildings at a cost of DM.10,000 to 20,000, *L. sepiaria*, and *Paxillus acheruntius* [*R.A.M.*, 26, p. 572].

Lohwag (K.). **Fäuletypen des Holzes.** [Types of wood rot.]—*Holz a. Roh- u. Werkst.*, 11, 2, pp. 54–56, 4 figs., 1953.

Most of the contributions listed in the author's review of the literature on various types of wood rot have been noticed from time to time in this *Review*.

Silverborg (S. B.). **Fungi associated with the decay of wooden buildings in New York State.**—*Phytopathology*, 43, 1, pp. 20–22, 1 fig., 1953.

Besides several unidentified Thelephoraceae, 25 species of fungi were found to be associated with decay of the woodwork of farm buildings, greenhouses, cold storage plants, dairies, warehouses, and other structures in New York State [cf. *R.A.M.*, 32, p. 159] during a comprehensive survey from 1947 to 1951. The most frequent were *Odontia spathulata* and *Lenzites sepiaria*, which accounted for about 25 per cent. of the collections, followed by *Fomes roseus* [ibid., 32, p. 158], *Poria xantha*, and *L. trabea*. Other important species were *Grandinia farinacea*, *Peniophora pubera*, *Corticium scutellare*, *Schizophyllum commune* [cf. next abstract], *Poria ferruginosa*, *Coniophora cerebella* [*C. puteana*], and *P. vaillantii*. *Merulius lacrymans* is rare in the United States but was observed on one occasion in the course of these investigations.

Narayanamurti (D.), Purushotham (A.), Ranganathan (V.), Jain (N. C.), Pande (J. N.), George (J.), & Bist (B. S.). **Weathering trials on aircraft wings.**—*Indian For.*, 77, 4–6, pp. 247–266, 296–312, 393–400, 14 pl., 7 diags., 70 graphs, 1951.

In weathering tests at the Forest Research Institute, Dehra Dun, India, fruiting bodies of *Schizophyllum commune* [cf. *R.A.M.*, 31, p. 156, and preceding abstract] were noticed on the trailing edge facing north of a detached Anson aeroplane wing made of laminated plywood after four months' exposure. Bacterial decomposition of casein glue was also observed. At Cochin a species of *Poria* was found attacking the plywood of an Oxford port-wing. [This paper was also published separately as *Indian For. Rec.*, N.S., 1, 1, 45 pp., 1951.]

Holmgren (H. F.). **Erfahrungen mit Feldversuchen an Holzschutzstoffen in Schweden.** [Observations in field experiments on timber preservatives in Sweden.]—*Holz a. Roh- u. Werkst.*, 11, 2, pp. 70–72, 2 graphs, 1953.

The first timber preservatives used in Sweden were coal tar oil and zinc chloride, which were succeeded by copper sulphate and subsequently by a great number of commercial preparations, necessitating the performance of laboratory and field experiments for their evaluation. Full particulars are given of the official accelerated method of testing practised in the field and in decay chambers instituted in 1943, two progress reports on which have already appeared [*R.A.M.*, 32, p. 1].

Suolahti (O.). **Holzschutz und Holzschutzforschung in Finnland.** [Timber preservation and research into timber preservation in Finland.]—*Holz a. Roh- u. Werkst.*, 11, 2, pp. 69–70, 1953.

Timber preservation has been practised in Finland [cf. *R.A.M.*, 31, p. 584] since 1904, principally on the railways, in the postal and telegraphic services, and in large electrical undertakings. In 1950 the Finnish Association for Timber Preservation was founded to disseminate information. Among the projects undertaken at the State Technical Research Institute, Helsinki, are an index of the native lignicolous fungi, a study on *Fomes igniarius* [ibid., 31, p. 93], and investigations on a volatile growth factor in wood that influences fungal growth [loc. cit.] (published in 1952) and on the influence of fungi, especially *Coniophora* [*puteana*: loc. cit.; ibid., 32, p. 112], on the water content of wood.

Simon (A.) & Tönjes (H.). **Beiträge über des Verhalten von Natriumpentachlorophenolat als Holzimprägnierungsmittel.** [Contributions to the mode of action of sodium pentachlorophenolate as a wood preservative.]—*Holz a. Roh- u. Werkst.*, 11, 3, pp. 104–111, 1 diag., 1 graph, 1953.

The results of quantitative and qualitative determinations showed that sodium

pentachlorophenolate diffuses equally well with sodium fluoride through neutral substances comparable to wood, e.g., chromotographic paper, and that in impregnated wood blocks some 30 to 35 per cent. of the chemical resists removal by leaching notwithstanding its high degree of solubility in water. Acid substances in the wood assist its retention.

KRZYZEWSKI (J.). **The hot-and-cold bath preservative treatment of Jack Pine and Spruce crossarms with pentachlorophenol solution.**—*Mimeogr. Can. Dep. Resour. Developm.* 0–166, 5 pp., 4 pl., 1952. [Mimeographed.]

Immersion of jack pine [*Pinus banksiana*] cross-arms in a 5 per cent. solution of pentachlorophenol [*R.A.M.*, 32, p. 159] in medium-weight petroleum oil at 220° F. for six hours and cooling in the bath for 48 hours was a reasonably efficient preservative treatment. Absorption of the preservative was not adequate for the treatment of spruce cross-arms.

BELLMANN (H.) & FRANCKE-GROSMANN (HELENE). **Versuche zur Tränkfähigkeit verblauten Kiefernsplintholzes.—Erste Mitteilung. Tränkung mit öligen Imprägniermitteln.** [Experiments on the impregnability of blued Pine sapwood.—First note. Saturation with oily preservatives.]—*Holz a. Roh- u. Werkst.*, 10, 12, pp. 456–463, 5 figs., 2 graphs, 1952.

The results of experiments at the Federal Institute for Forestry, Reinbek, Germany, showed that the more extensive the blueing of pine sapwood by *Ophiostoma* [*Ceratostomella* or *Ceratocystis*] *ips*, *O. clavatum* [*R.A.M.*, 31, p. 42], *O. canum* [loc. cit.], *Trichosporium tingens* [loc. cit.] and its var. *macrosporum*, and *Leptographium lundbergii* [ibid., 9, p. 77], the longer must the wood be dried before the medullary rays can take up an oily preservative, such as coal tar oil. Stained wood [cf. ibid., 32, p. 599] should preferably be stored under a roof supported by pillars to permit proper ventilation, and on no account in a closed shed or covered with tarred felt. It is advisable to heat the wood at 70° to 80° C. before impregnation by the Rueping process [ibid., 32, p. 49] to expedite the shrinkage and death of the hyphae, so that the pits provide supplementary channels for the penetration of the preservative [cf. next abstract].

HERZIG (J.). **Tränkversuche an saftfrischen bis lagertrockenen Fichtenmastenabschnitten mit verschiedenen Tränkflüssigkeiten und Tränkverfahren als Funktion der Lagerzeit.** [Impregnation experiments on green to storage-dry Spruce pole sections with different impregnation fluids and impregnation methods as a function of the storage period.]—*Holz a. Roh- u. Werkst.*, 11, 2, pp. 60–64, 4 figs., 1 graph, 1953.

In experiments at the Lothringen mine, Bochum-Gerthe, Germany, the amount of chrome arsenic salt (basilite UA) [*R.A.M.*, 26, p. 369; 28, p. 100] taken up and the depth of its penetration [cf. next abstract] increased steadily with a decrease in the moisture content of spruce poles, but with coal tar oil the position was reversed. Poles in a storage-dry condition were more deeply penetrated by basilite UA than by coal tar oil. Closure of the pits in the sapwood, which impedes the penetration of oily fluids in particular, appears to occur at moisture contents ranging from 50 to 75 per cent. [cf. preceding abstract]. It should, however be practicable to increase the depth of penetration by the application of the excess pressure and vacuum procedures to January-felled and peeled poles dried for three to five months under natural conditions to less than fibre saturation point.

SCHUCH (K.). **Über die Bestimmung des Fluors im Holz.** [On the determination of fluorine in wood.]—*Holz a. Roh- u. Werkst.*, 11, 2, pp. 64–66, 1953.

Chemico-analytical procedures have been found indispensable at the Institute

for Applied Mycology and Timber Preservation, Hann.–Münden, Germany, for the determination of the amount and distribution of preservatives in impregnated wood [cf. preceding abstract], which is essential to a judgement of their protective performance. The zircon-alizarin reagent has proved useful for the qualitative determination of fluorine, while a quantitative method based on that of Willard and Winter [*R.A.M.*, 31, p. 74] has been applied to the quantitative detection of sodium fluoride in pine sapwood blocks.

Peter (O.). **Prüfung der Sublimateindringung bei der Holzimprägnierung mit Röntgenstrahlen und künstlich-radioaktivem Quecksilber.** [Assay of sublimate penetration in timber impregnation with Röntgen rays and artificially radio-active mercury.]—*Holz a. Roh- u. Werkst.*, 11, 2, pp. 50–54, 6 figs., 5 graphs, 1953.

By applying soft X-rays to kyanized spruce and pine wood [*R.A.M.*, 32, p. 225] it is possible to detect the well-known abrupt decrease in mercuric chloride content towards the interior and to reveal in the peripheral zone isolated strands, up to several cm. in length and about 0·1 mm. in diameter, of very high concentration, termed 'mercuric chloride deposits', which appear to be connected with the so-called excess uptake. Neither excess uptake nor deposit formation resulted from the addition of 6·6 per cent. sodium chloride to the usual 0·66 per cent. mercuric chloride concentration. In the 'warm' treatment (24 hours at 40° C. and 120 at normal temperature) spring wood takes up more mercuric chloride than summer wood. Autoradiographs, obtained by the addition to the preservative solution of artificially radio-active mercury^{203} in the form of mercuric chloride, revealed an exponential decline in concentration towards the interior of the spruce stems. The addition of sodium chloride scarcely altered the depth of penetration in spruce, but it was considerably increased in pine. Wood samples treated by radio-activity are very suitable for leaching tests. Fixation remained good even in the presence of sodium chloride.

Theden (Gerda). **Ergebnisse mykologischer Holzschutzmittel-Untersuchungen nach abgewandelten Prüfverfahren.** [Results of mycological studies on wood-preservatives by modified testing procedures.]—*Holz a. Roh- u. Werkst.*, 11, 2, pp. 41–45, 6 figs., 1 diag., 1953.

At the Material Testing Centre, Berlin-Dahlem, the efficacy of a water-soluble and an oily wood-preservative in the control of *Coniophora cerebella* [*C. puteana*] and *Poria vaporaria* [*R.A.M.*, 32, p. 225] was tested by a modified procedure in which sticks measuring 0·4 by 0·7 by 5 cm. were substituted for the standard wood blocks. The new method is economical of time, requiring only eight weeks or exceptionally 11, i.e., half that necessary for the standard, but the 'threshold value' results of the two procedures were not in full agreement, and it is concluded that the wood blocks cannot be replaced by sticks as a routine measure.

Another series of experiments (not yet completed) was designed to test the efficacy of 'peripheral protection', in which a preservative coating is applied merely to the surface of the wood, as opposed to full immersion. The results obtained with 44 oily and water-soluble products were very variable, some affording complete protection against *Lentinus lepideus* [loc. cit.] and *C. puteana*, while others permitted the fungi to traverse the intact peripheral zones and destroy the interior of the wood.

Andrus (C. F.). **Evaluation and use of disease resistance by vegetable breeders.**—*Plant Dis. Reptr*, 37, 4, pp. 206–215, 1953. [Multilithed.]

In this discussion of disease resistance as an objective in vegetable breeding the

danger of under- or over-emphasis on resistance is considered in view of experience gained in the United States during the last 40 years [cf. *R.A.M.*, 30, pp. 53, 143]. Plants should be tested for disease reaction at the optimum level of infection at which the various degrees of resistance are most clearly distinguishable. For the evaluation of foreign accessions a minimum, uniform rating system for all vegetable diseases is proposed. It is preferable to test an individual plant for reaction to one pathogen at a time to avoid possible interactions. The best sources of resistant stocks may be found at the centres of early cultivation rather than in the place of origin of the genus or species.

BLAIR (I. D.). **Disease in farm and garden seeds.**—*Agric. Bull. Canterbury Chamber Comm.*, 271, 7 pp., 1952.

The control and prevention of seed-borne organisms impairing the development of plants grown from infected seed in New Zealand are dealt with in this paper. A supplementary table summarizing the seed-borne diseases of major importance in New Zealand arable farming includes swede dry rot (*Phoma lingam*) [*R.A.M.*, 32, p. 353; C.M.I. map No. 73], bean [*Phaseolus vulgaris*] halo blight and wilt (*Phytomonas* [*Pseudomonas*] *medicaginis*) [f.sp. *phaseolicola*: ibid., No. 85; *R.A.M.*, 27, p. 116], pea collar rot and pod blight (*Ascochyta pisi* and *A.* spp.) [ibid., 32, pp. 415, 530; C.M.I. map No. 273], the leaf spots of celery caused by *Cercospora apii* [*R.A.M.*, 31, pp. 362, 543] and *Septoria apii* [ibid., 27, p. 116], and onion smut (*Urocystis cepulae*) [ibid., 22, p. 6; C.M.I. map No. 12].

ROBERTSON (A. G.) & OGILVIE (L.). **Root rot of Brassicas caused by Phytophthora megasperma.**—*Plant Path.*, 2, 1, p. 15, 1953.

Root rot of Savoy cabbage and winter cauliflower observed at Long Ashton, Somerset, in March, 1949, and of marrowstem kale at Gloucester in October, 1950, was caused by *Phytophthora megasperma* [*R.A.M.*, 16, p. 292; 29, p. 240; 31, p. 394; 32, p. 413]. In the first case the lower leaves displayed progressive purpling from the margins, wilted, and were shed (particularly Savoy) or remained lying in a rosette round the plants. The stems also were soft and flaccid. Infected kale was easily pulled up and exhibited marked sloughing of the cortex and finer lateral roots. Adventitious roots sometimes developed above the lesions and temporarily maintained turgidity. The infected plants were growing in poorly drained, heavy clay.

Soil inoculations of Snowball winter cauliflowers caused the development of purpling and cortical rotting and the fungus was re-isolated from the plants.

EDDINS (A. H.). **Transmission of Cabbage black rot at Hastings, Florida.**—*Plant Dis. Reptr*, 37, 4, pp. 216–219, 1953. [Multilithed.]

Studies on the transmission of cabbage black rot (*Xanthomonas campestris*) [*R.A.M.*, 32, p. 413] were carried out at the Potato Investigations Laboratory, Florida Agricultural Experiment Station, Hastings, from 1947 to 1951, inclusive. Half of the plants grown from non-treated seed in newly-cleared land in 1947–8 became diseased. When seed was soaked for 25 minutes in water at 122° F. only 2 per cent. of the plants grown in a commercial field in 1949 developed the disease, though there had been 98 per cent. infection in the same field the previous year. Eight per cent. of the plants grown from treated seed in an experimental plot of soil infested the year before became affected. During the cool 1950–1 season the disease developed in some seedlings and thinned plants grown in non-infested soil from inoculated seed, but not in those grown from treated, non-inoculated seed in either infested or non-infested soil.